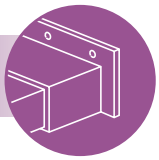
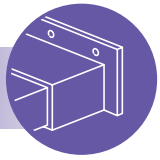
GENERAL CATALOG

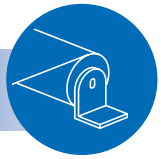
THE COMPANY



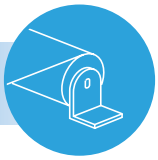
1 - TELESCOPIC STEEL COVERS
- Standard products.....page.02



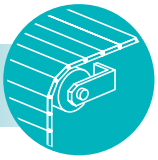
2 - TELESCOPIC STEEL COVERS
- Special products page.06



3 - ROLL-UP COVERS
- Standard products page.09



4 - ROLL-UP COVERS
- Special products page.13

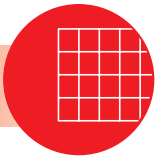


5 - FLEXIBLE ALUMINUM AND RIVETED APRON COVERS page.22

6 - THERMIC-WELDED AND FLAT COVERS page.24

7 - ROUND BELLOWS.....page.40

8 - WIPERS AND BRUSHES page.43



9 - FABRIC MATERIAL LIST page.46

Innovation, quality and cost effective products have made the **P.E.I. Group** one of the leading European manufacturers of protective covers for machine tools.

Our success is based on more than **20 years** of manufacturing experience that blend our commercial, technical and manufacturing know-how.

Our emphasis on innovation has lead to more than 30 international patents. The **P.E.I Group** invests more than 4% of total revenue in Research and Development to insure that our products, thermic-welded and flat covers, roll-up covers, apron covers, and telescopic steel covers, meet the constantly evolving customer requirements.

P.E.I.'s trump card has always been its choice to guarantee its customers the best possible service.

The Group manages the entire product design cycle, from prototype, to refining the technical solution, and then to producing and delivering the product.

Lastly, sizeable investments have been made to optimize the production process which allows us to provide consistent quality products at highly competitive prices.

P.E.I. Group's successful strategy arose from the extraordinary intuition of its founding partners in perceiving the importance of safety in the workplace, which lead to the machine tool protection market in the 1980's. Over the past few years the Group has enjoyed enormous growth, almost doubling the Group's sales. Today, it is the leading protective cover manufacturer in Italy with over 50% market share.

THE COMPANY

The Bologna Group has more than 140 employees working at three locations: **P.E.I. S.r.l. (located in Calderara di Reno, Bologna); Zanini S.r.l.**, which produces light structural steel work (located in Zola Predosa, Bologna); and **S.P.E.R. S.r.l.**, a company that manufactures thermic-welded and flat covers, sewn round bellows, heat formed round bellows, apron covers and telescopic steel covers (located in Cremona).

The Group's commercial organization has contributed to its success. **P.E.I. Group** has a widespread network that guarantees coverage throughout Italy, with particular attention given to the area with a high concentration of machine tool manufacturers. P.E.I. is one of the leaders in the European protective cover market. This market is highly fragmented and P.E.I. has over 10% market share.

4.500 sqm

P.E.I. GmbH, a company owned branch, allows the Bologna Group to service and support our new growing markets in Germany, the Czech Republic, Slovenia and the Slovak Republic. P.E.I. sells and supports it products in North America through its partner A&A Manufacturing Company, Inc., based in New Berlin, Wisconsin, USA.

8.000 sqm

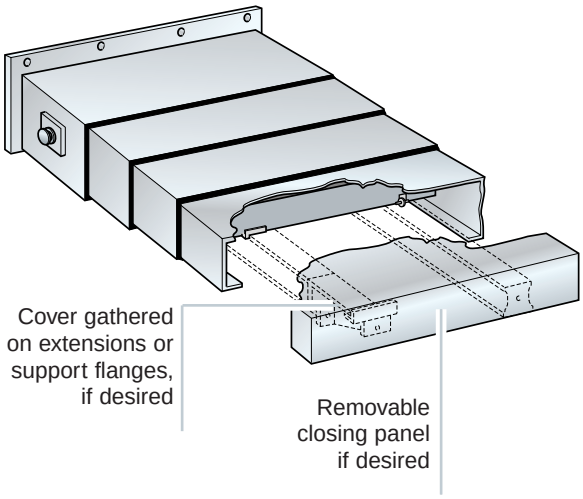
The "**made by P.E.I.**" products are also distributed in France, Spain, Austria, Belgium, Switzerland, Turkey, and Taiwan through trade agreements.

4.500 sqm

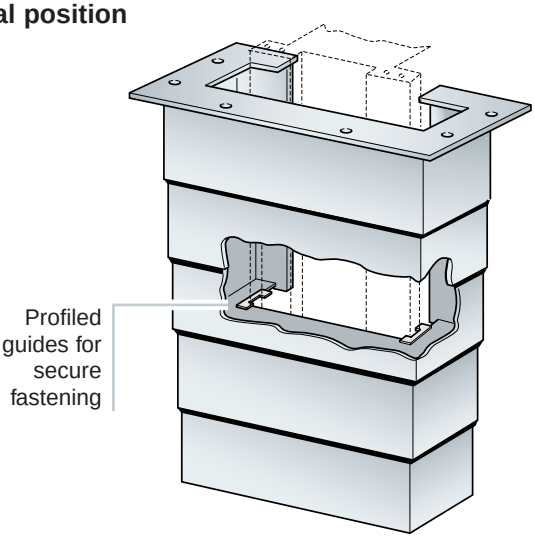
Standard Products

There are many companies throughout the world who manufacture or sell **Telescopic Steel Covers**. Our company has achieved production levels - in terms of volume and quality standards - that place it at the top of the market. Heavy investment in machinery and personnel training, under the guidance of highly qualified engineers have allowed us to face the latest challenge in the development of Machine Tools: the use of high speed linear motors. The quality of design and manufacture, often with patented shock absorbers, allow us to solve problems resulting from high speeds. At the same time, our company gives utmost consideration to the quality/price ratio, insuring that our customers get the most from their investment.

Horizontal position

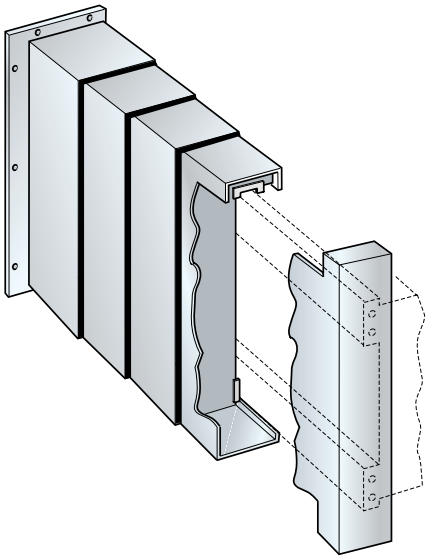


Vertical position

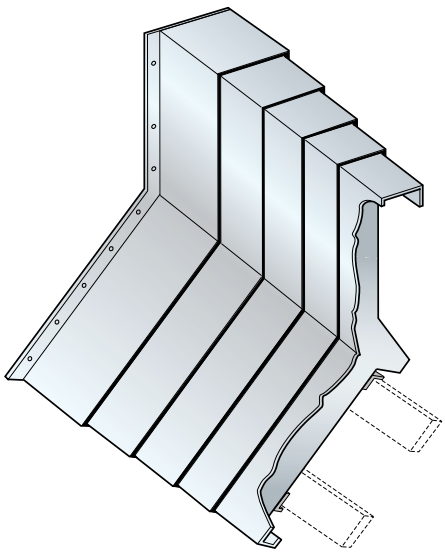


Snap-on guides available upon request for rapid frontal installation

Transverse position



Transverse LATHE cover



Standard Products

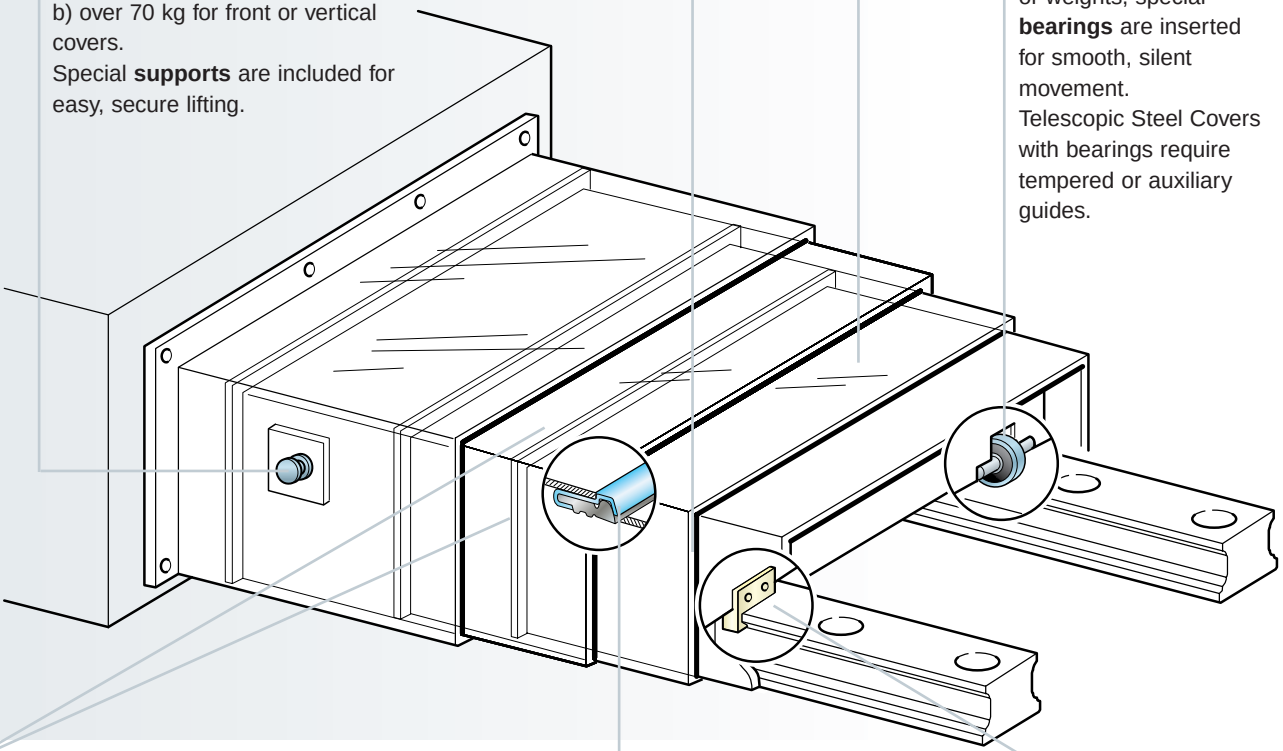
Telescopic Steel Covers are not simple products to manufacture. They require high-quality materials and components, as well as sophisticated manufacturing technologies.
High movement speeds call for continuous innovation.

Special anti-friction **brass guides** or **wipers** with polyurethane rubber are inserted on the sides of the Telescopic Steel Covers, at the discretion of the engineer based on speed, seal and dimensions.

The **steel** used is extremely high quality in terms of flatness, corrosion resistance and wear resistance.
Thickness ranges from 1.5 to 3 mm.
Telescopic Steel Covers may also be made of stainless steel.

For heavy covers:
a) over 110 kg for horizontal covers
b) over 70 kg for front or vertical covers.
Special **supports** are included for easy, secure lifting.

For high speeds or weights, special **bearings** are inserted for smooth, silent movement.
Telescopic Steel Covers with bearings require tempered or auxiliary guides.



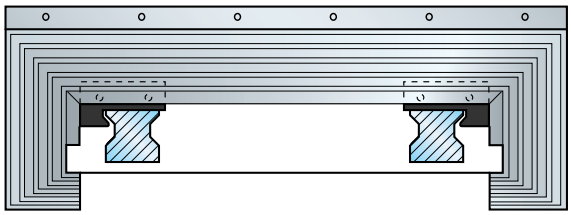
For high speeds, **P.E.I. shock absorbers** (patent pending) are inserted in these positions.
They are very effective in reducing impact between boxes during movement.
These shock absorbers allow working speeds considerably higher than those previously possible, while simultaneously reducing noise levels and wear.
This innovation, together with precision production methods, make it possible to accomodate even the fastest machine tools.

Wipers keep the surface clean and prevent chips and shavings from getting onto expensive rails. They must be heat and coolant resistant, and thus are made of polyurethane, with or without a protective stainless steel chip guard.

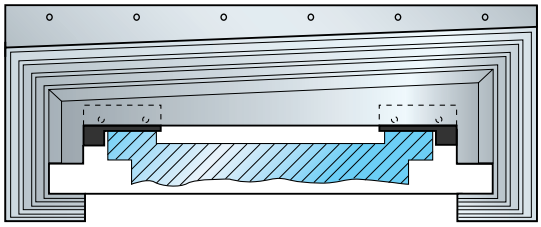
Compact, low-speed Telescopic Steel Covers are equipped with special anti-friction brass or non-metallic **guides**.

CONFIGURATIONS

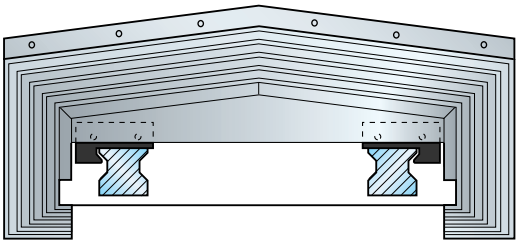
Shape 1



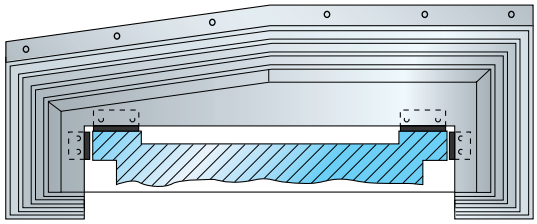
Shape 2



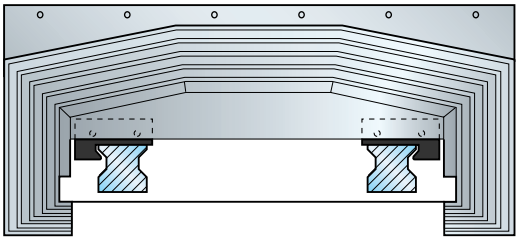
Shape 3



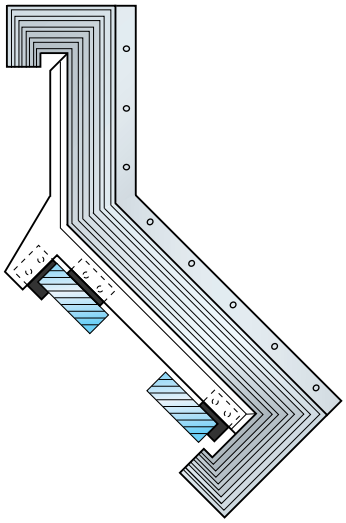
Shape 4



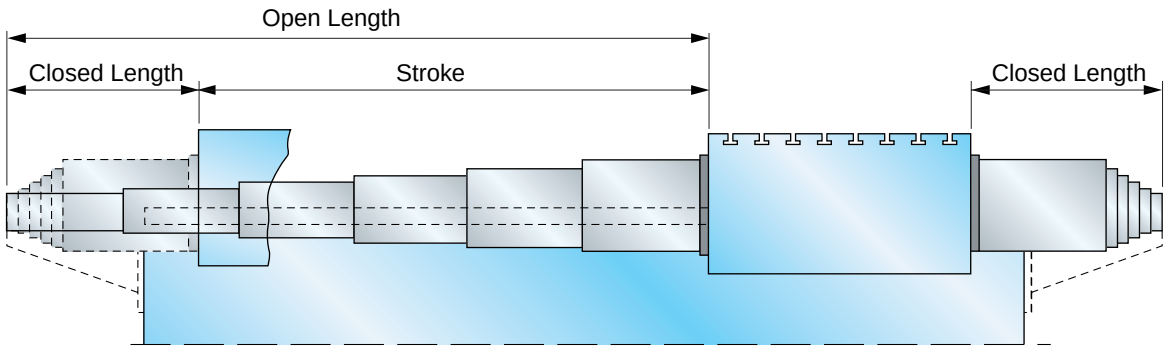
Shape 5



Shape 6



NOTE: Only a few standard configurations of Telescopic Steel Covers are shown above.



TELESCOPIC STEEL COVERS

TELESCOPIC STEEL COVERS QUESTIONNAIRE

Type of machine: .....

Trade mark: .....

Model: ..... **Axis:**.....

Cover code: .....**Canister qt.** .....

Acceleration: ..... **m/sec^2** **Speed:** .....**m/min**

Working Position	☐ Horizontal	☐ Vertical
	☐ Crosspiece	☐ Inclined
Sliding	☐ by skids	☐ by rollers
Treadability	☐ Yes	☐ No
Coolant	☐ Yes	☐ No

Customer:.....

Street:.....no. .....

Town .....**Land** .....

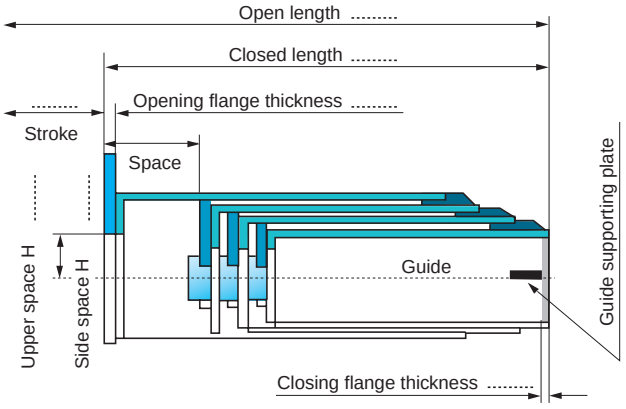
Reference person: .....

Phone: .....

Fax:.....

E-mail:.....

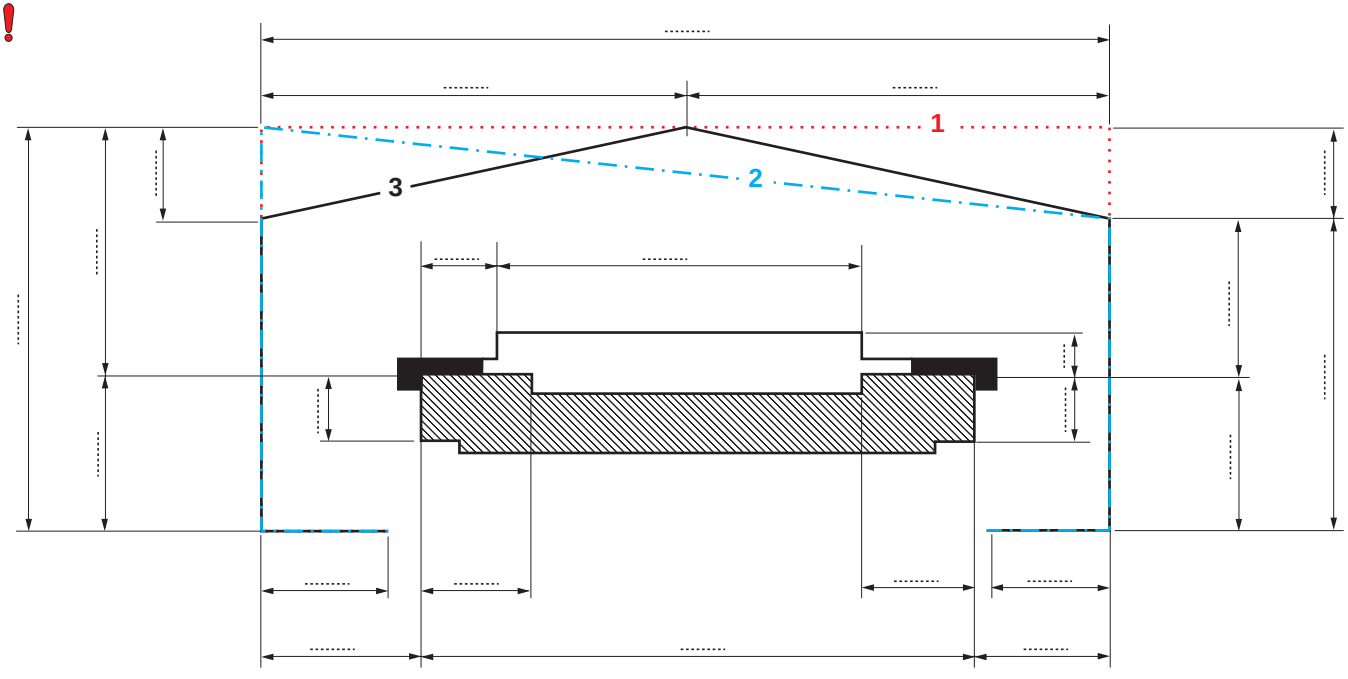
Required quantity Pcs:..... **Right:**..... **Left:**.....



Please indicate the Cover overall, fastenings excluded.

Desired shape: 1 ··· ☐ 2 ·– ☐ 3 —☐

View from the opening flange ☐ **View from the closing flange** ☐



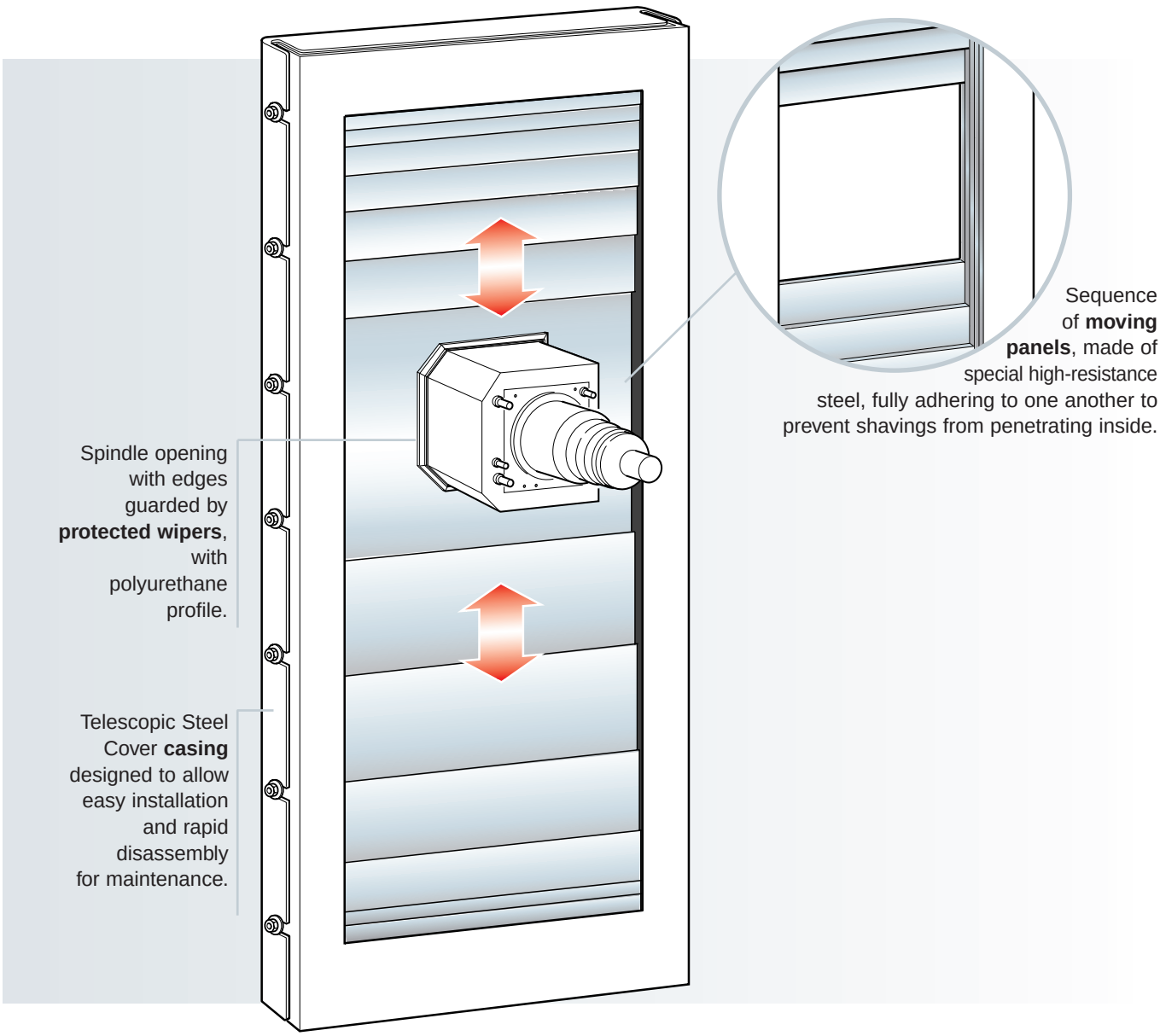
Opening Flange sketch

Closing Flange sketch

NOTE: The data fields and/or tables marked by ! are required in order to give you a quotation.

Special Product: SHEET-POCKET ™

The **SHEET-POCKET™** Telescopic Steel Cover is the most effective solution for shielding the Y-axis (vertical) in horizontal machining centers. **It can achieve speeds up to 150 m/min. and accelerations of 2 g**. It is supplied in a fully enclosed frame that is independent from the machine structure. The self-contained sheet-pocket is easy to install and remove for maintenance or inspection.
The dimensions are defined by our technicians together with the customer's engineers to maximize the working area.

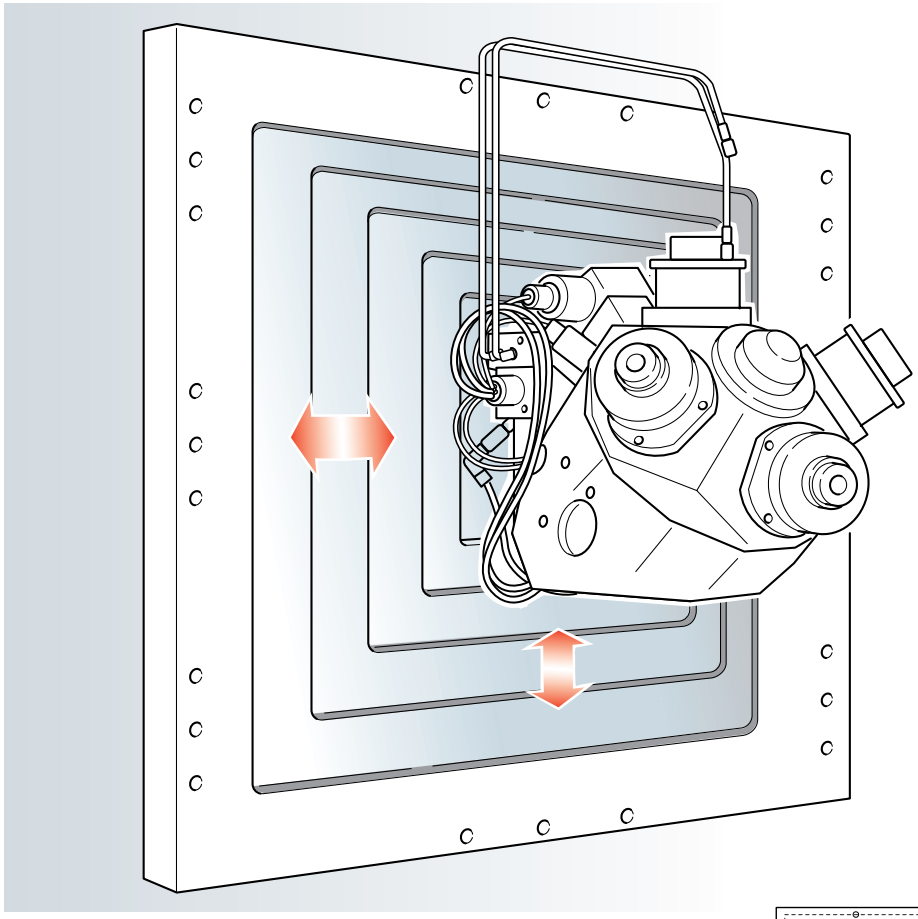


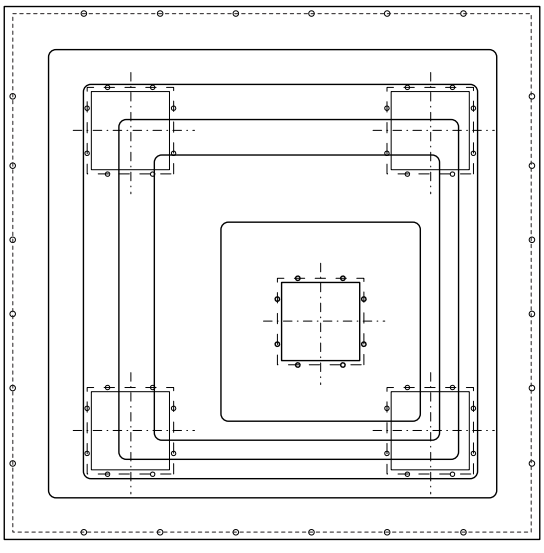
The **SHEET-POCKET™** Telescopic Steel Cover can be easily combined with **SURE-SPRING®** roll-up covers as shown on page 13 of this catalog.

(patent pending)

Special Product: SQUARE SLIDING COVER ™

This family of **Telescopic Steel Cover**, was designed to meet special needs that frequently arise on SPECIAL or TRANSFER machines and small machining centers. This configuration is especially innovative thanks to the patent-pending method for moving each individual panel, thus allowing users to take greater advantage of the available space.



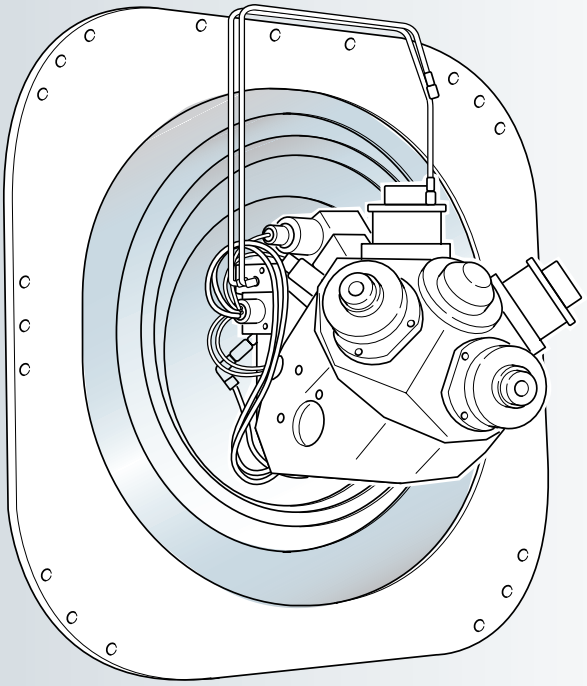


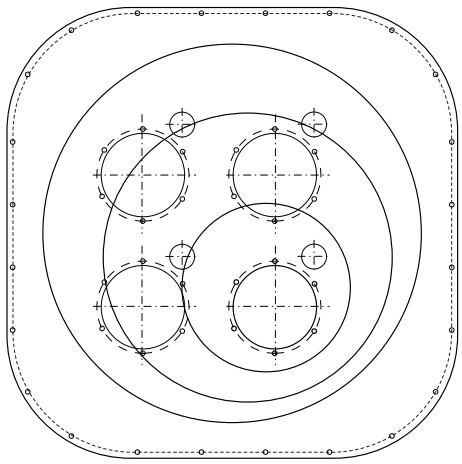
- **For dual-axis operation**
- **High speed**
- **Compact size**
- **Easy to install**
- **Maximum use of available space**

(patent pending)

Special Product: ROUND SLIDING COVER ™

Like the **SQUARE SLIDING COVER,** this type of **Telescopic Steel Cover** was designed to meet special needs that frequently arise on SPECIAL or TRANSFER machines and small machining centers. Since it has a wide range of applications, contact our Engineering Department to define the ideal sizing for the cover.



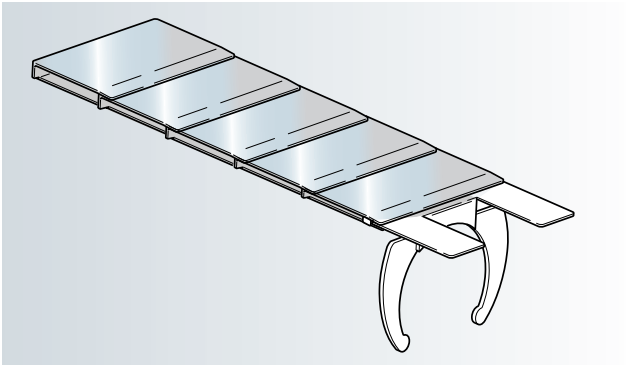


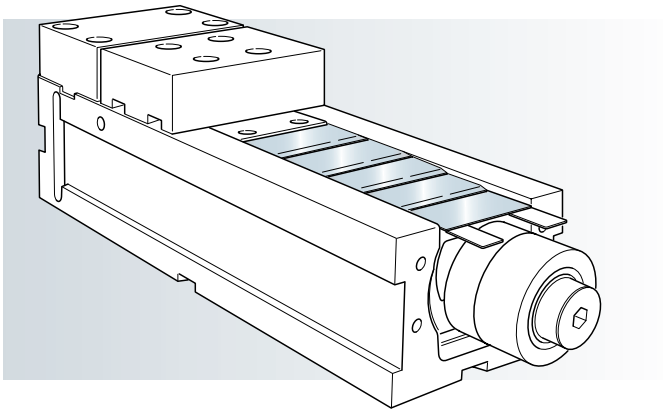
- **For dual-axis operation**
- **High speed**
- **Compact size**
- **Easy to install**

(patent pending)

Special Product: VISE GUARD

These covers solve a serious problem for vise manufacturers: protecting the screw that moves the mobile part from chips and tooling waste.
Since the design of these covers begins with a careful analysis of the vise design, contact our engineers to jointly define the type of protection needed.





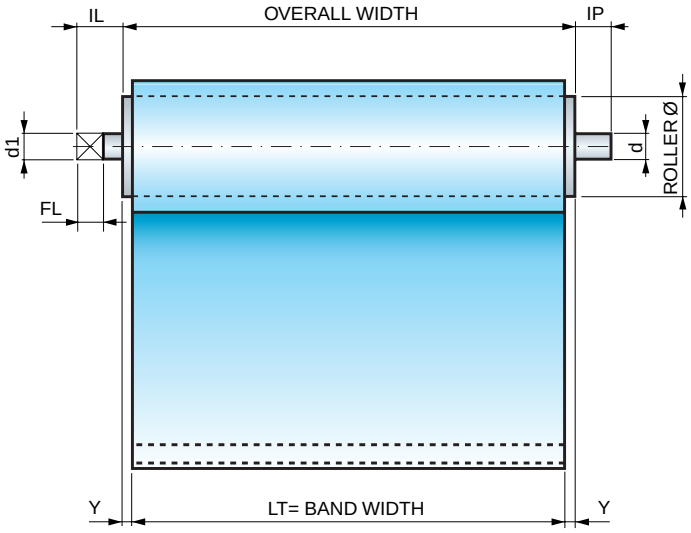
(patent pending)

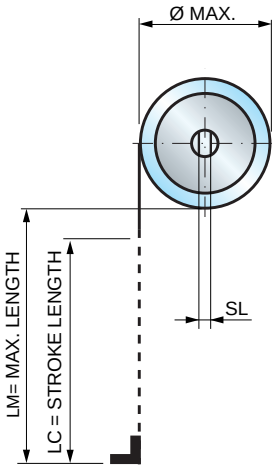
ROLL-UP COVERS

P.E.I. **Roll-up Covers** are normally equipped with our patented system of multiple springs. This offers countless advantages:

- **Reliability**
- **Extremely high speeds**
- **Resistance to high and low temperatures**
- **Compact size**
- **Easy installation**
- **Constant tensioning**
- **1,000,000 movements guaranteed**

ROLL-UP COVERS WITHOUT CANISTER





LM		2 . Y =
From	to	
0	400	4
401	600	5
601	800	6
801	1200	8
1201	1600	10
1601	2400	14
2401	3000	18
3001	3850	22
3851	4700	26
4701	5550	32

Shaft sizes

Standard Roll-up Covers

ROLLER Ø	d1	IL	FL	SL	d	IP
30	6	8	8	2,6	7	8
40-50-60-70 80-90-100-120	10	15	12	4	10	10

For special working conditions, our engineering department can adjust these dimensions. Carefully review the drawing enclosed with the proposal.

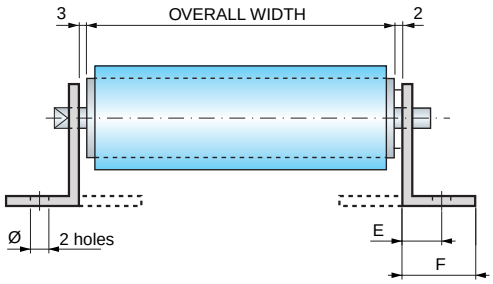
SURE-SPRING® Roll-up Covers

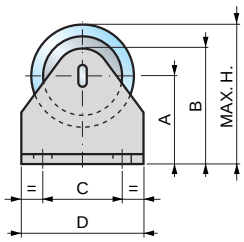
ROLLER Ø	d1	IL	FL	SL	d	IP
39-52-71	10	15	12	4	10	10

Formula for calculating the OVERALL WIDTH

OVERALL WIDTH = LT + 2Y

Example:
LM = 1000 LT = 500 2Y = 8
OVERALL WIDTH = 508





Measurements for standard supports

Code	A	B	C	D	E	F	Ø	maxH	Material
033	33	45	26	40	11	18	6,5	59	galvanized Fe 15/10
050	50	62	26	40	11	18	6,5	93	galvanized Fe 15/10
060	60	76	36	50	15	22	6,5	112	galvanized Fe 20/10
080	80	96	42	60	17	26	6,5	151	galvanized Fe 25/10
119	119	136	54	106	37	70	10	225	galvanized Fe 40/10

Formula for calculating max. Ø

$$MAX.Ø = 2 \cdot \sqrt{\frac{L \cdot s \cdot 1{,}20}{\pi} + r^2}$$

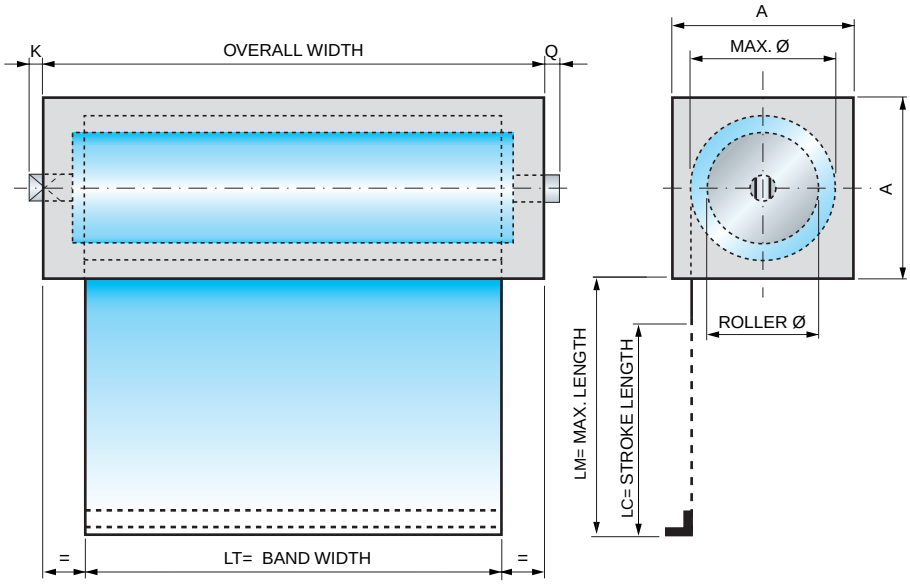
L = MAX. LENGTH TO WIND
s = BAND THICKNESS*
r = ROLLER Ø/2

(* see materials list on page 46)

ROLL-UP COVERS WITH CANISTER

Enclosing the roller offers many advantages:

- **Protects roller from accidental impact**
- **Integral wiper keeps band clean**
- **Attractive appearance**
- **Wide variety of fastening systems**
- **Materials: Aluminum, Steel, Stainless Steel**
- **1,000,000 movements guaranteed**



Canisters A x A
40 x 40
50 x 50
60 x 60
70 x 70
80 x 80
90 x 90
100 x 100
110 x 110
120 x 120
130 x 130
140 x 140
150 x 150

Canister material	K	Q	Z*
Aluminum	3	1	25
Steel	10	7	13
Stainless steel	10	7	13

Z*= FIXED COEFFICIENT

Recommended sizes

These tables list the recommended MAX. BAND LENGTH based on the OVERALL WIDTH.
The values shown are guaranteed at a MAX. SPEED of 40 m/min.
For higher speeds, contact our engineering department.

Size examples for Standard Roll-up Covers

ROLLER Ø 30	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	300	500	650	800	1000	1200	1350	1500
ROLLER Ø 40	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	400	600	900	1200	1500	1800	2000	2200
ROLLER Ø 50	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	450	700	1050	1350	1650	2000	2250	2450
ROLLER Ø 60	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	500	1000	1600	1900	2200	2500	2750	3000
ROLLER Ø 70	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	550	1100	1750	2050	2350	2600	2900	3150
ROLLER Ø 80	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	700	1300	2000	2350	2700	3100	3400	3700
ROLLER Ø 90	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	750	1400	2150	2500	2850	3200	3550	3850
ROLLER Ø100	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	800	1500	2300	2650	3000	3300	3700	4000
ROLLER Ø 120	OVERALL WIDTH	150	250	350	500	750	1000	1250	1500
	MAX. LENGTH	850	1600	2450	2800	3150	3400	3850	4150

Size examples for SURE-SPRING® Roll-up Covers

ROLLER Ø 39	OVERALL WIDTH	250	350	500	750	1000	1250	1500
	MAX. LENGTH	850	1250	1650	2000	2500	3000	3850
ROLLER Ø 52	OVERALL WIDTH	250	350	500	750	1000	1250	1500
	MAX. LENGTH	1000	1500	2000	2500	3000	3850	4700
ROLLER Ø 71	OVERALL WIDTH	250	350	500	750	1000	1250	1500
	MAX. LENGTH	1400	2100	2400	2850	3700	4800	5550

Formula for calculating the Minimum canister size = A

A = MAX Ø + 8

Formula for calculating the OVERALL WIDTH

With Steel and Stainless Steel canister

OVERALL WIDTH =

$$LT + Z + 2Y^* + \left(\frac{LM}{100}\right)$$

Example with Steel canister:

LT= 500 2Y= 8 LM =1000

LM/100 =10 Z= 13

OVERALL WIDTH = 531

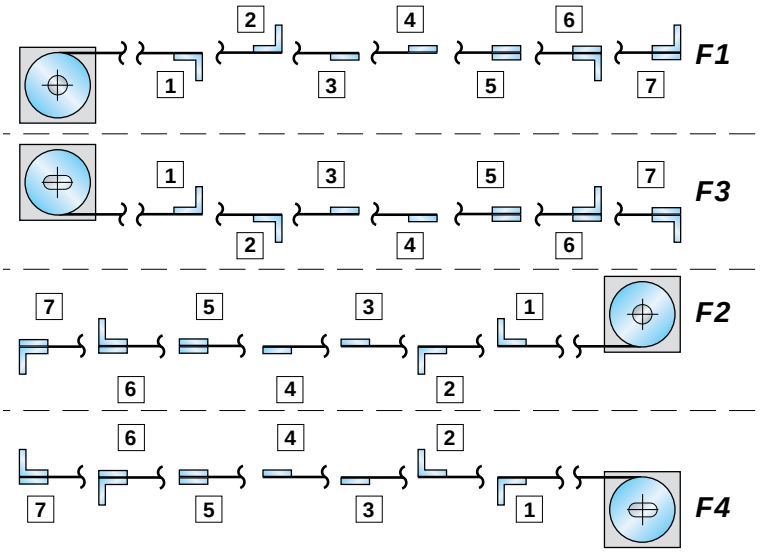
(* see 2Y table on page 9)

INSTALLING ROLL-UP COVERS

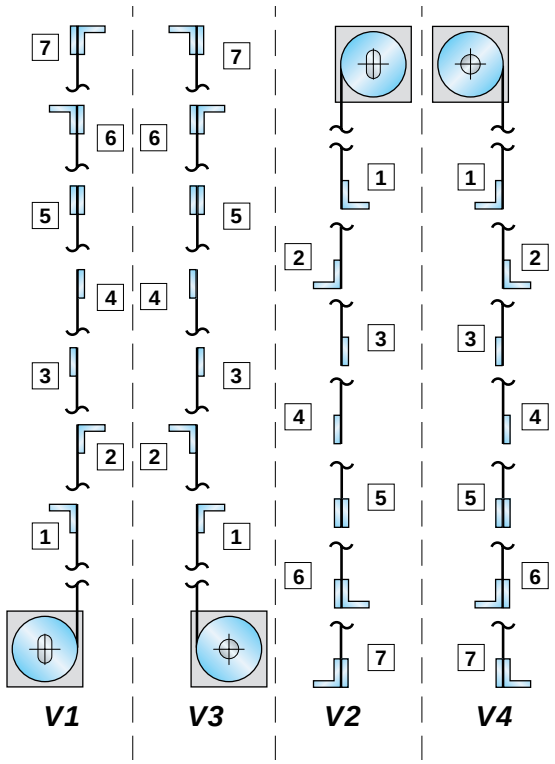
This diagram is valid for all Roll-up Covers, and shows:

- **Terminal type**
- **Terminal position on the band**
- **Band output direction**
- **View of shaft/tab**

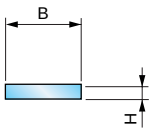
Horizontal and frontal positions



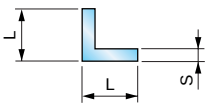
Vertical positions



Terminal materials: Aluminum, Steel

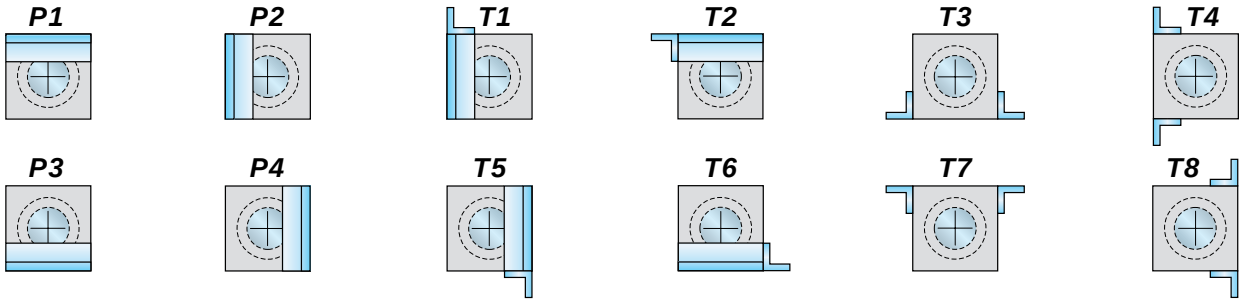


B x H
15 x 3
20 x 3
30 x 3

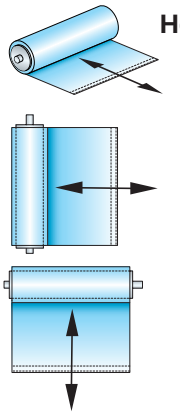


L x L x S
15 x 15 x 3
20 x 20 x 3
30 x 30 x 3

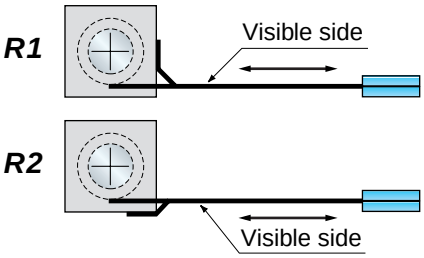
Standard canister mounting systems: To describe the canister attachment system, place one of the drawings below over the selected roll-up cover position, above. Do not rotate either drawing.



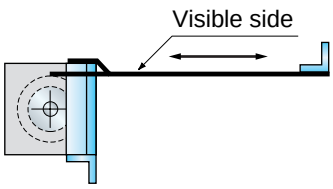
Positions



Wiper: This diagram shows the 2 ways to install the wiper to the canister.



Example assembling code



Working position	F1
Terminal attachment	2
Canister attachment	T5
Wiper position	R2

ROLL-UP COVERS QUESTIONNAIRE

! Type of machine on which the ROLL-UP COVER is to be installed:
- ❑ METAL working machine
- ❑ MARBLE working machine
- ❑ GOLD working machine
- ❑ PAPER working machine
- ❑ FABRIC working machine
- ❑ GLASS working machine
- ❑ FOOD processing machine
- ❑ PHARMACEUTICAL processing machine
- ❑ AGRICULTURAL processing machine
- ❑ TANNING machinery
- ❑ CLAY working machine
- ❑ WOOD working machine

❑ Other .....

! Type of material falling on the band:
- ❑ Steel shavings
- ❑ Cast iron shavings
- ❑ Brass shavings
- ❑ Aluminum shavings
- ❑ Wood shavings
- ❑ Ambient dust
- ❑ Grinding swarf
- ❑ Welding splatter

❑ Other .....

! Liquids to which the band will be exposed:
- ❑ Water/steam
- ❑ Coolant/oils
- ❑ Oils with a viscosity of ISO .....
- ❑ Other .....

! Amount of material falling on the band: .....Kg

! Temperature of material falling on the band: .....°C

! Temperature of work area: .....°C

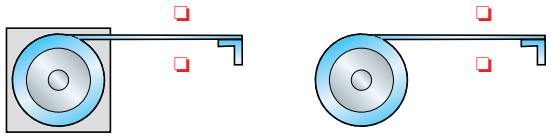
! Max. rapid travel speed: .....m/min.

! Max. acceleration: .....g

! Max. working motions per hour: .....

! Max. daily working hours: .....

! Please mark the visible side of the band



Sketch

! Company name .....
Contact person: .....
Phone.: .....**Fax:** .....
Quantity: .....
Annual demand: .....
Date: .....
Notes: .....
.....

❑ **STANDARD ROLL-UP COVER**
❑ **SURE-SPRING® ROLL-UP COVER**

! ❑ **WITH** canister ❑ **WITHOUT** canister

! LT= BAND WIDTH .....mm

! LM= MAX. LENGTH .....mm

! OVERALL WIDTH calculated .....mm

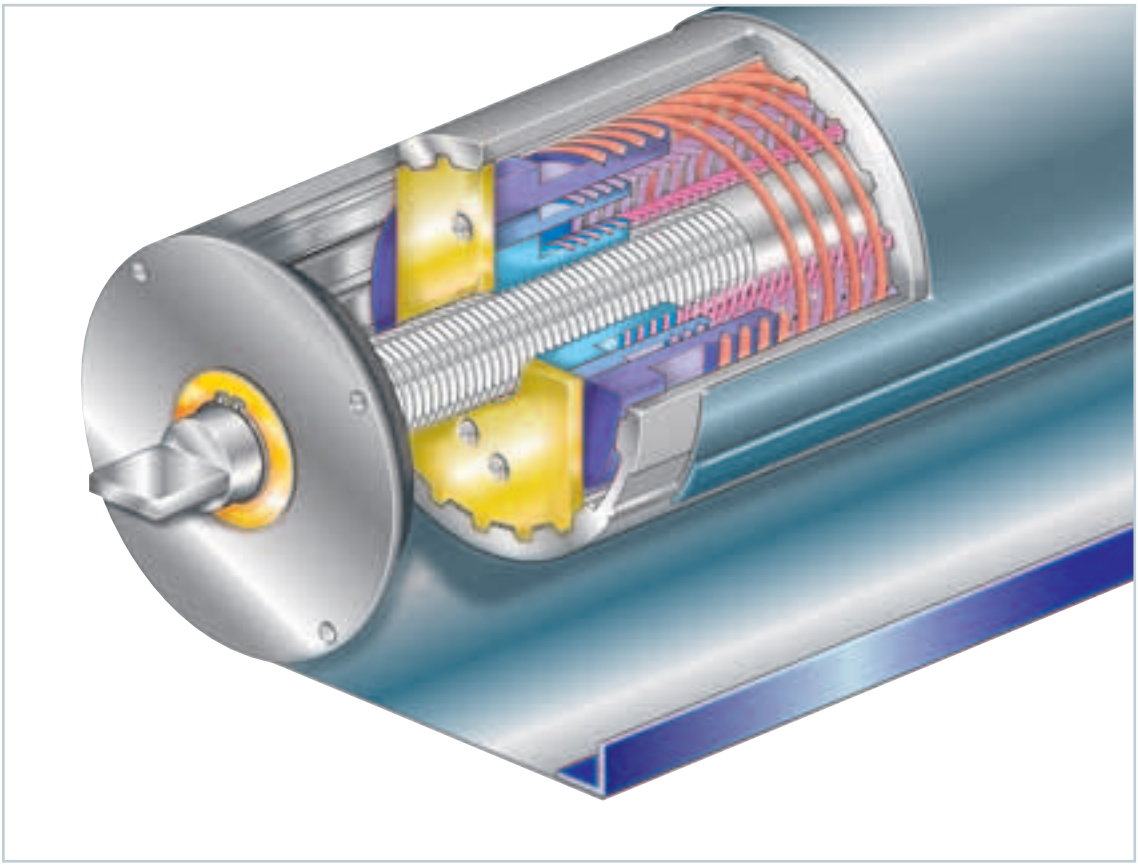
! Working position: ❑Horizontal ❑ Frontal ❑Vertical
❑F 1 ❑F 2 ❑F 3 ❑F 4
❑V 1 ❑V 2 ❑V 3 ❑V 4

- **TEMAT Band material code:**
  ❑ 001 ❑ 002 ❑ 202 ❑ 003 ❑ 004 ❑ 005
  ❑ 007 ❑ 008 ❑ 009 ❑ 091 ❑ 101 ❑ 102
  ❑ 104 ❑ 105 ❑ 106 ❑ 011 ❑ 012 ❑ 013
  ❑ 014 ❑ 015 ❑ 151 ❑ 161 ❑ 160 ❑ 162
  ❑ 164 ❑ 165 ❑ 167 ❑ 169 ❑ 017 ❑ 018
  ❑ 019 ❑ 020 ❑ 022 ❑ Other .....
- **Ø** Selected **Roller** .....mm
- **Ø** Calculated **Max.** .....mm
- **Support code:**
  ❑ 033 ❑ 050 ❑ 060 ❑ 080 ❑ 119
- **Canister material:** ❑ Alu ❑ Steel ❑ Stainless steel
- **Canister dimensions:**
  ❑40x40 ❑50x50 ❑60x60 ❑70x70
  ❑80x80 ❑90x90 ❑100x100 ❑110x110
  ❑120x120 ❑130x130 ❑140x140 ❑150x150
- **Canister attachment system:**
  ❑P1 ❑P2 ❑P 3 ❑P 4 ❑T1 ❑T2
  ❑T3 ❑T4 ❑T5 ❑T6 ❑T7 ❑T8
- **Wiper position:** ❑R 1 ❑R 2
- **Terminal attachment system:**
  ❑1 ❑2 ❑3 ❑4 ❑5 ❑6 ❑7
- **Terminal material:** ❑ Aluminum ❑Steel
  ❑15x3 ❑20x3 ❑30x3
  ❑15x15x3 ❑20x20x3 ❑30x30x3

GENERAL TOLERANCES ± 1%

NOTE: The data fields and/or tables marked by ! are required in order to give you a quotation.

Special Product: SURE-SPRING®



The P.E.I. **Patented design** known as **SURE-SPRING®** represent the most advanced level of technical innovation in the field of roll-up covers.
The spring mechanism design takes into account the intrinsic defects in other rollers available on the market, and overcomes them by means of a radical new design of the spring mechanism.
The second major innovation consists of the mechanical system to fasten the band to the tube. No adhesives are needed for this roll-up cover!!
In addition to those of standard P.E.I. roll-up covers, P.E.I. **SURE-SPRING®** roll-up covers offer the following advantages:

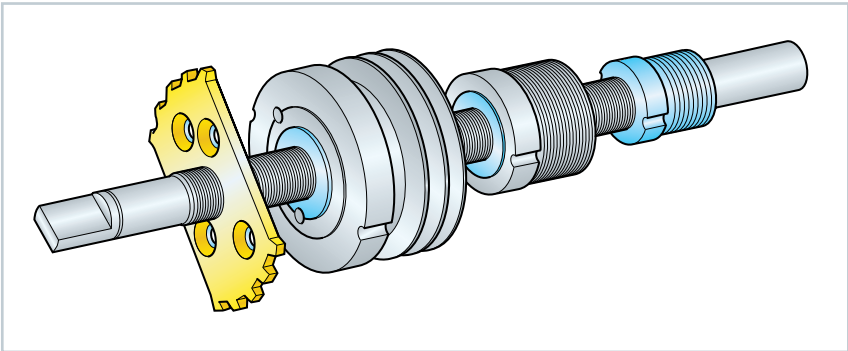
- **Advancement speeds of up to 150 m/min.**
- **Acceleration of up to 2 g.**
- **2,000,000 movements guaranteed.**
- **For recommended dimensions see page 10.**

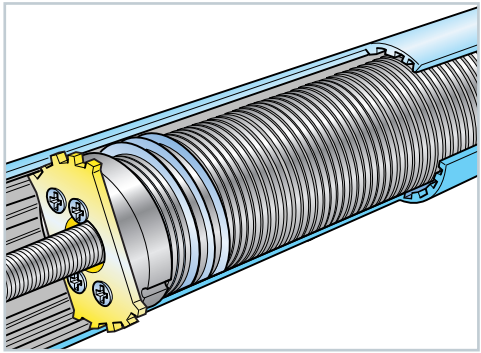
(patent pending)

SURE-SPRING® Technical Specifications

Transmission
The rotary movement of the tube in relation to the fixed central shaft is transmitted by a sliding spline. This system compensates for the elongation of the multiple springs by moving the spring mounting point axially along a threaded shaft.

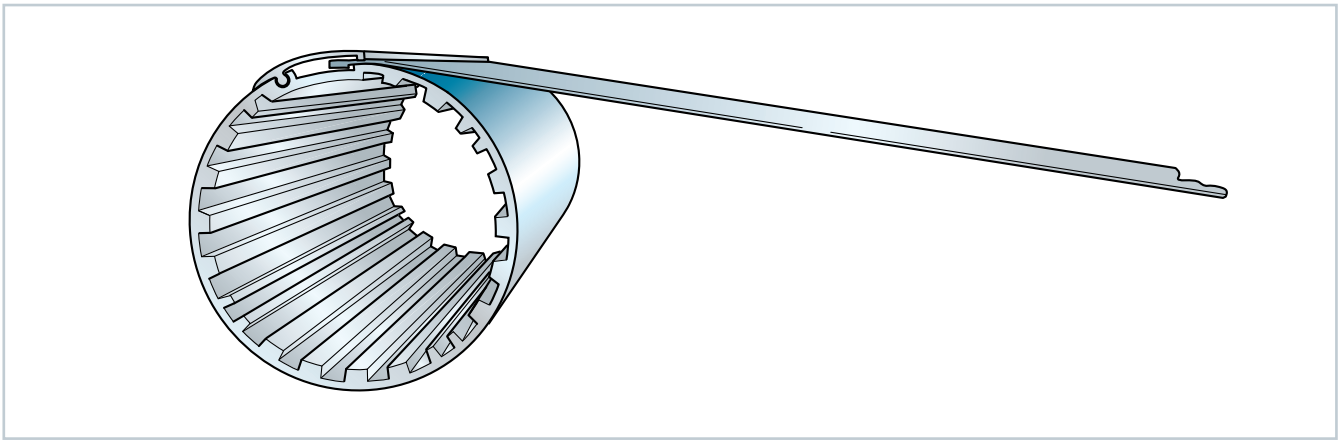
Innovative features
This new system allows the multiple springs to work according to an ideal geometry, keeping their coils properly spaced.





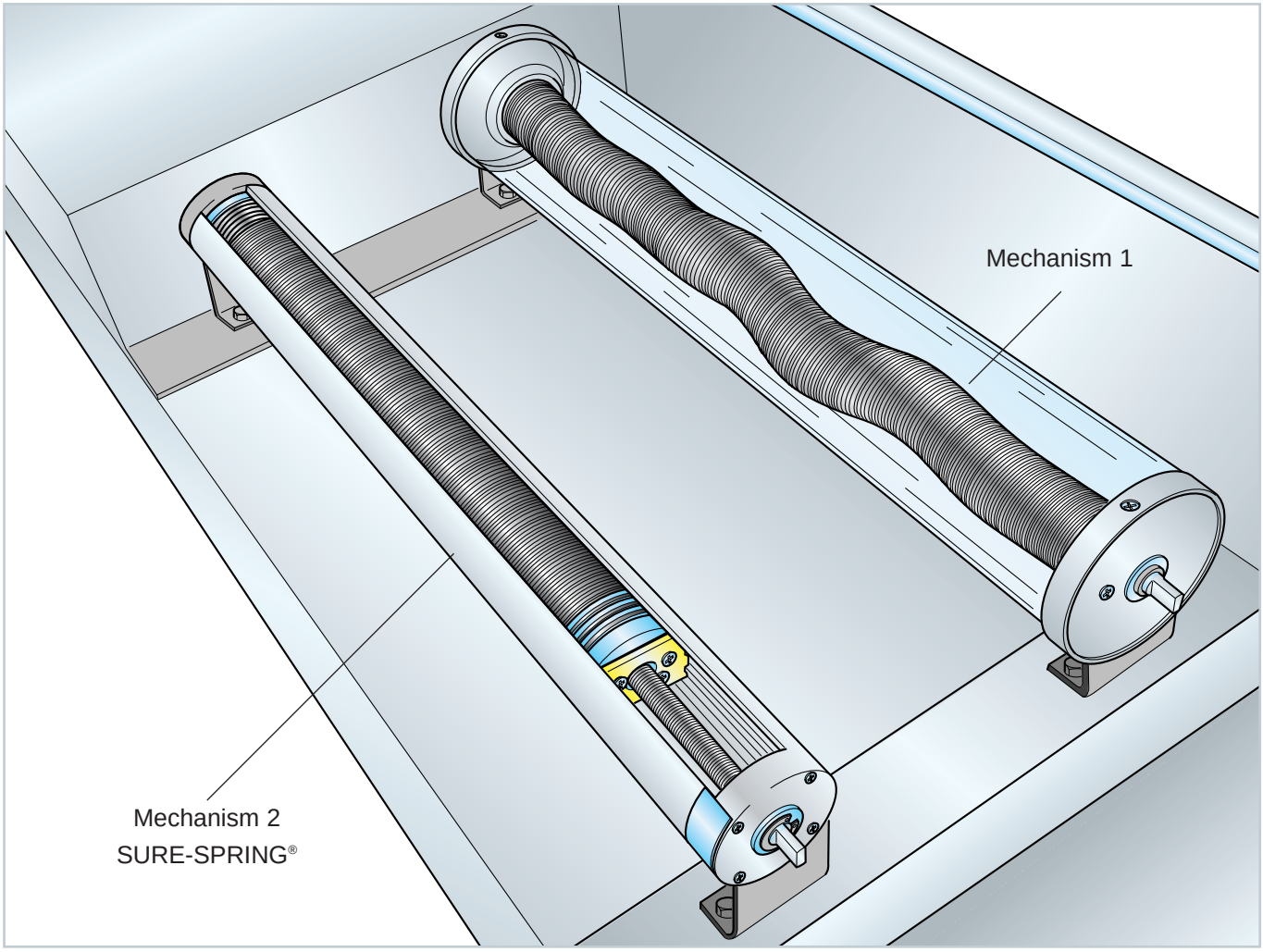
- **Suitable for HIGH SPEED operation**
- **The multiple springs remain COAXIAL**
- **The springs NEVER INTERSECT**
- **REDUCED overall diameters**
- **EXCELLENT reliability**

Mechanical system attaching the band to the tube
This is the most reliable system for insuring a secure attachment between the band to the tube. The advantages of this system are:



- **SECURE attachment of the band to the tube, because NO adhesive products are used**
- **PRACTICAL maintenance, since the band can be replaced quickly and easily**
- **Also suitable for use in work environments where STRONGLY AGGRESSIVE chemicals are used**
- **HEALTHY for the environment**

SURE-SPRING® Operating diagram



Mechanism 1: Traditional system
Mechanism 2: P.E.I. **SURE-SPRING®** system

This illustration clearly highlights the different behavior of the spring mechanisms during operation:

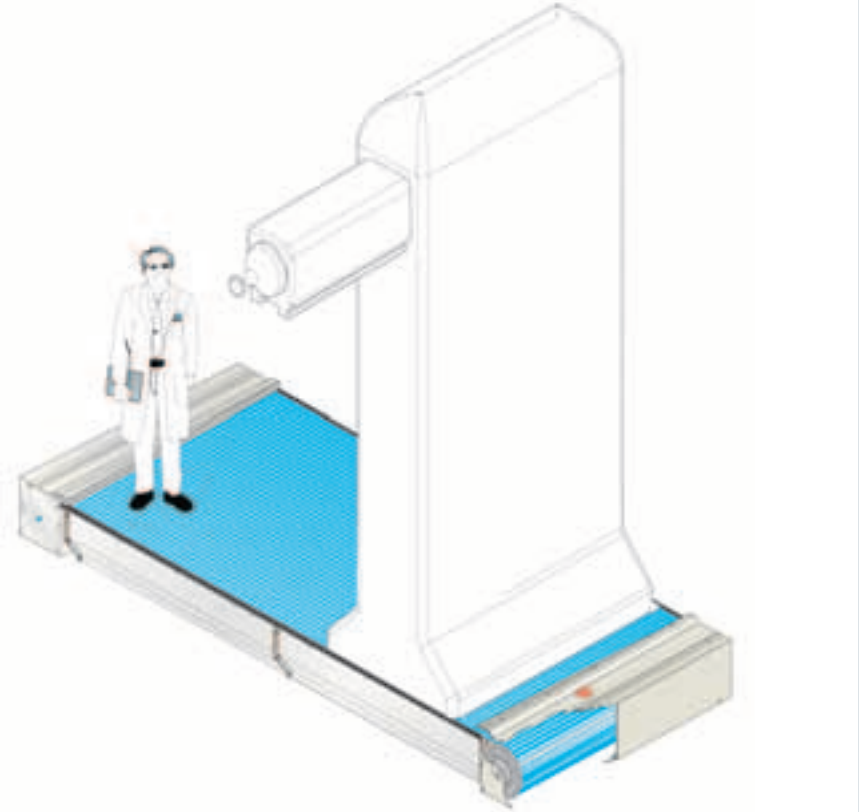
- In mechanism 1 (traditional system) the springs are rigidly attached to the fixed caps at the ends of the shaft. In this system the springs helically twist and snake while winding or unwinding, causing obvious problems of friction and wear between the coils as well as between the coils and the central shaft.

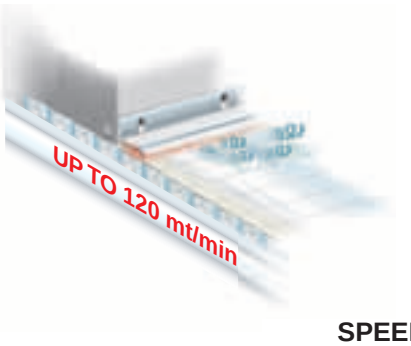
- In mechanism 2 (**SURE-SPRING®** system) the springs are attached to a special moving cap, which slides lengthwise while winding and unwinding, keeping the spring coils packed and concentric at all times. This spring configuration avoids most of the wear mentioned above, allowing better performance and a much longer operating life-span for the spring mechanism.

Special Production: ROLL-UP COVERS WITH COVER TYPE J

Roller protections equipped with **type-J SHUTTERING** are particularly suitable for covering large bases, pits or holes. These protections have the following characteristics:

- **SPEED**: suitable for high speed applications, both dry and coolant processing.
- **QUIET**: thanks to the mechanical roller system, there is no noise caused by collisions or vibrations.
- **STRENGTH**: particularly suitable for pedestrian applications.
- **CLEANING**: the belt slide on the side of the shaving conveyor has been designed to make the shaving fall in the conveyor without causing any clogging.
- **RAPID MAINTENANCE**: if some elements are damaged the belt does not need to be removed. The damaged elements can be removed simply by unscrewing lateral screws.

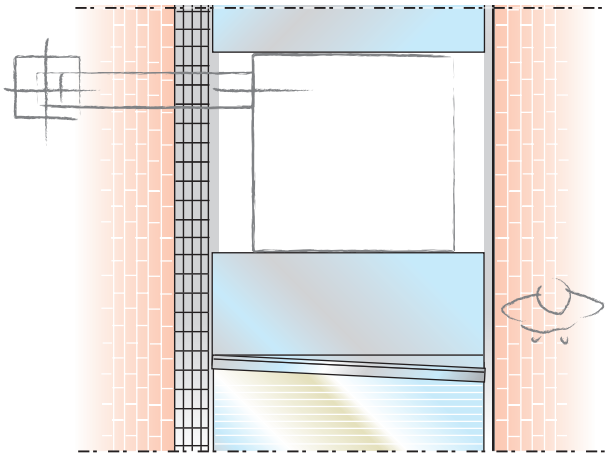


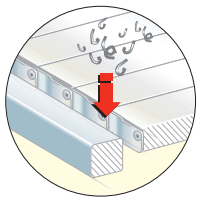


SPEED

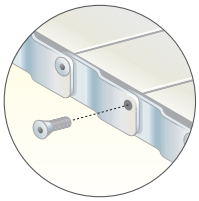
STRENGTH

The wiper is slightly angled relative to the travel direction of the cover so as to force the chips and coolant towards the chip conveyor trough side.





CLEANING

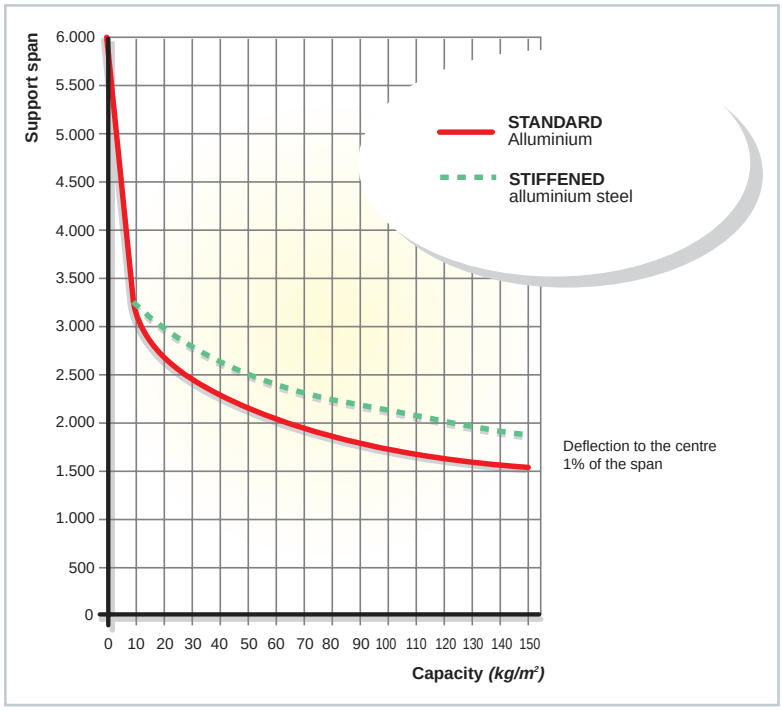


RAPID MAINTENANCE

Special Production: ROLL-UP COVERS WITH COVER TYPE J

TECHNICAL DATA FOR COVER TYPE J

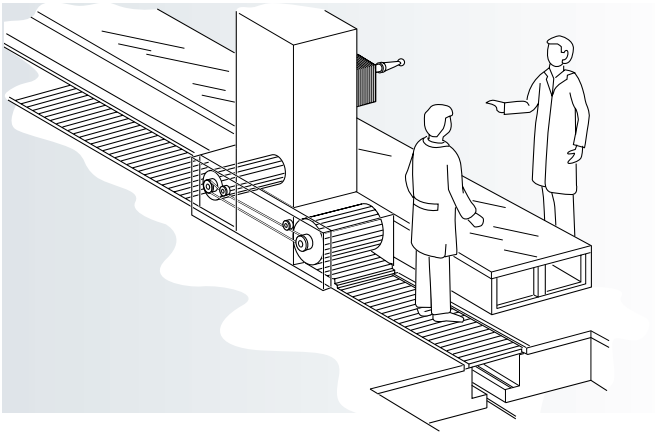
- **Entirely** made of metal
- Perfect **flatness** of the side exposed to chips
- Cleaning **wiper** on the side exposed to chips
- **Shielded** joint with integrated labyrinth to prevent coolant from getting trough
- High **bending resistance**. See graphic of Span/Capacity
- **Reinforced version** with steel profiles
- Highly resistant to tensile stress. Minimum guaranteed **2 KN/m of width**
- Steel lateral caps with **chain** joint
- Thickness of the carpet: **18 mm**
- Take-up in both directions on a **150 mm** diameter
- Reduced weight: **12.5 kg/sqm** **(29 kg/sqm** for the reinforced version)
- **Modular** system with individual interchangeable elements
- Operating speeds up to **120 m/min**
- Life guaranteed: **1.000.000** movements



P.E.I. manufactures these moving walkway/pit covers for horizontal, mobile surfaces, to meet accident prevention and safety regulations. These units cover the upper part of the machine pit whose base is below the walking surface and allow the crossing of the pit by anyone, thus avoiding possible accidents or damage to people or equipment which could occur with the pit uncovered.
The variable speed drive system, which allows for mechanical speed control, makes the drive system independent from the general machine control system. Size and speed are established by the customer and studied by our technical staff in order to obtain optimal operation.

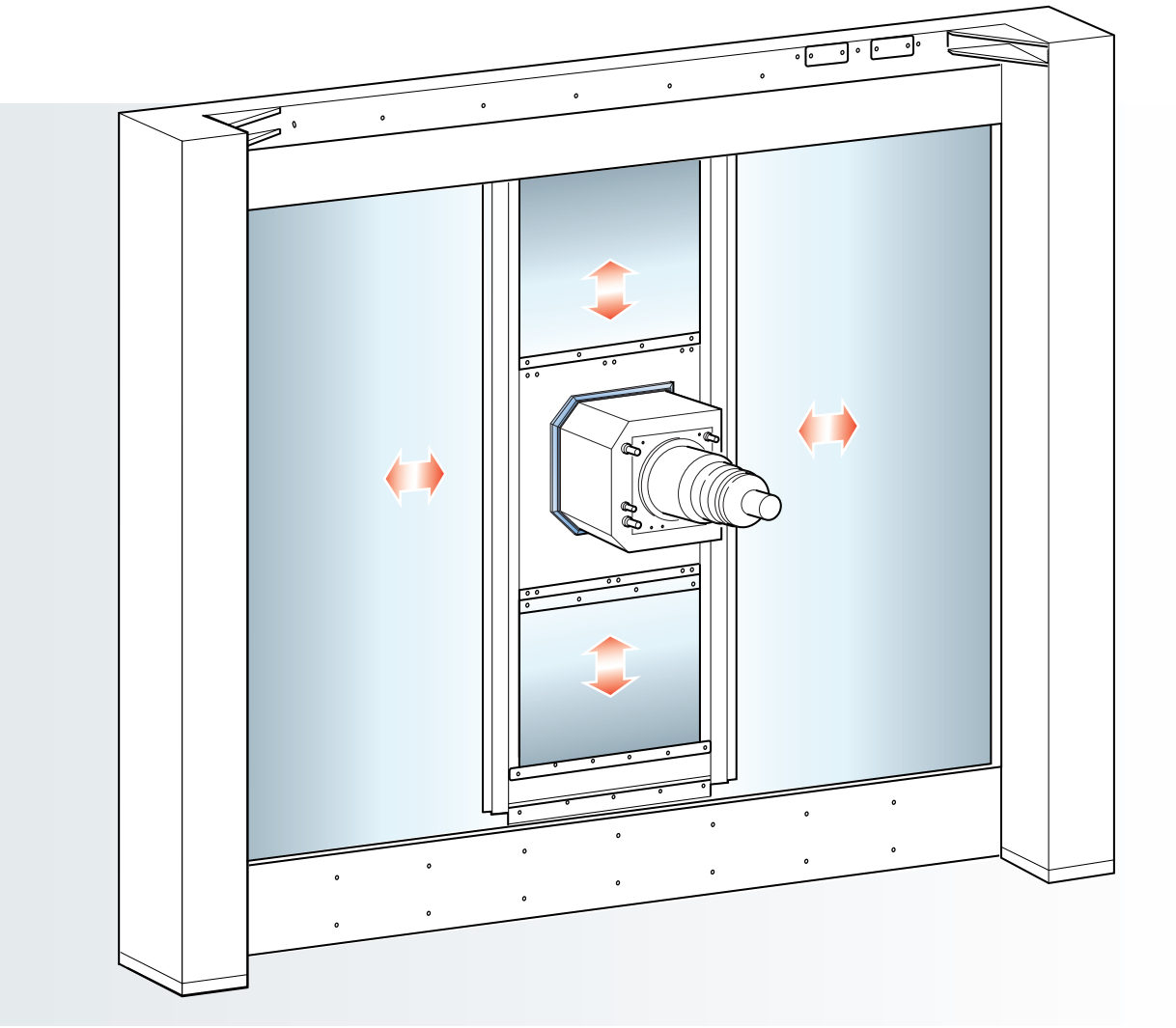
Special Product: Roll-up Covers with Chain Movement

P.E.I.'s patented system of **ROLL-UP COVERS WITH CHAIN MOVEMENT** have the essential feature of keeping the strip perfectly fixed while the machine is running.



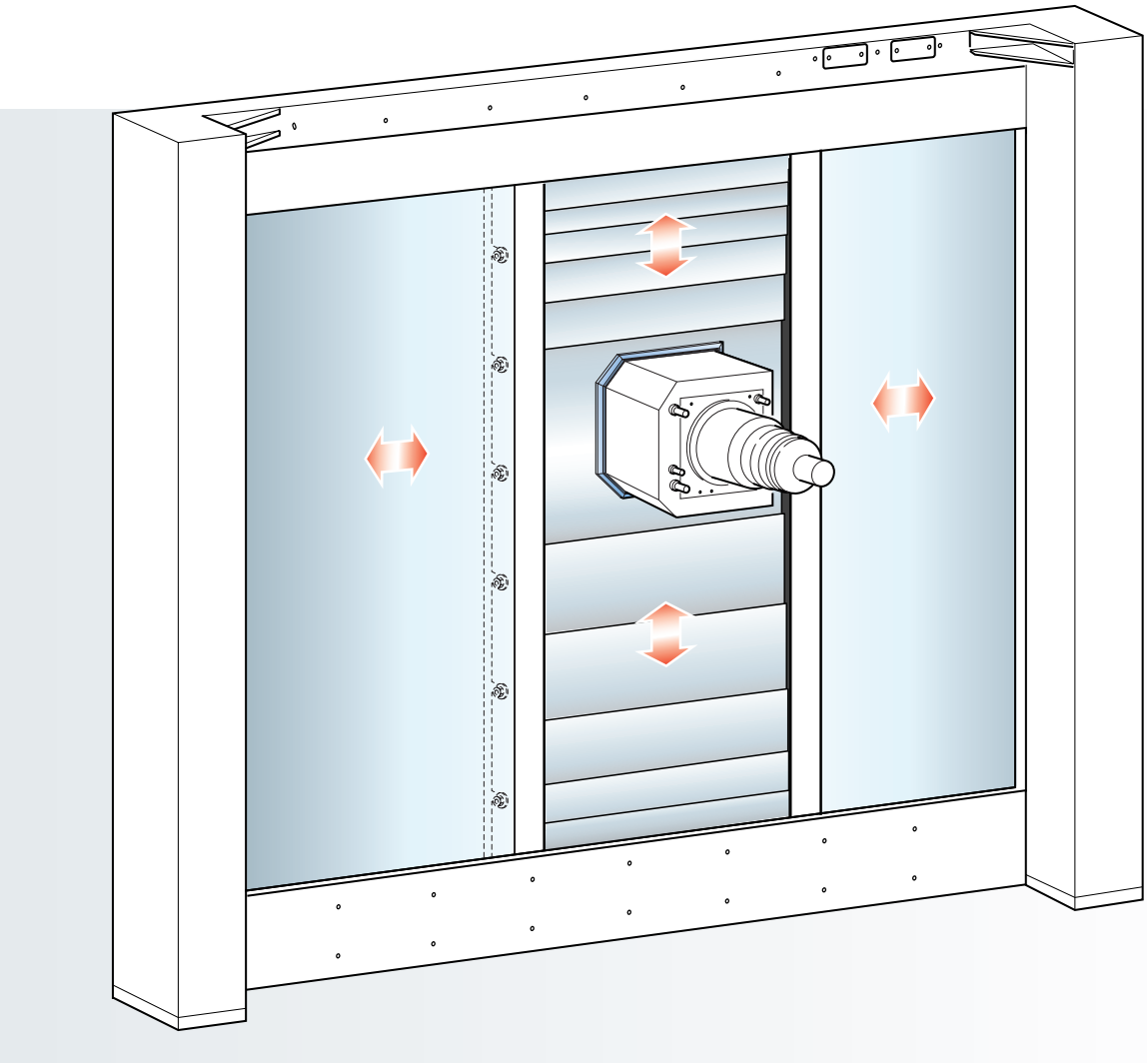
- The band is fixed relative to the floor, allowing people to cross the machine trench at any time even while the machine is in operation.
- During operation, the special interconnecting chain causes the unwinding action of one roll to automatically wind-up the opposite roll. Our patented compensating mechanism keeps the system in balance, even though the diameters of rolls continously change.
- The patented compensating mechanism is very compact and is mounted to the machine column in its own canister.
- The patented design insures a perfectly functional and reliable design.
- Upon request, we can design a system using DC or pneumatic motors.
- The dimensions, layout, and speed of travel are developed for each order and can meet your exact needs.

Special Product: X-Y 4R SHIELD



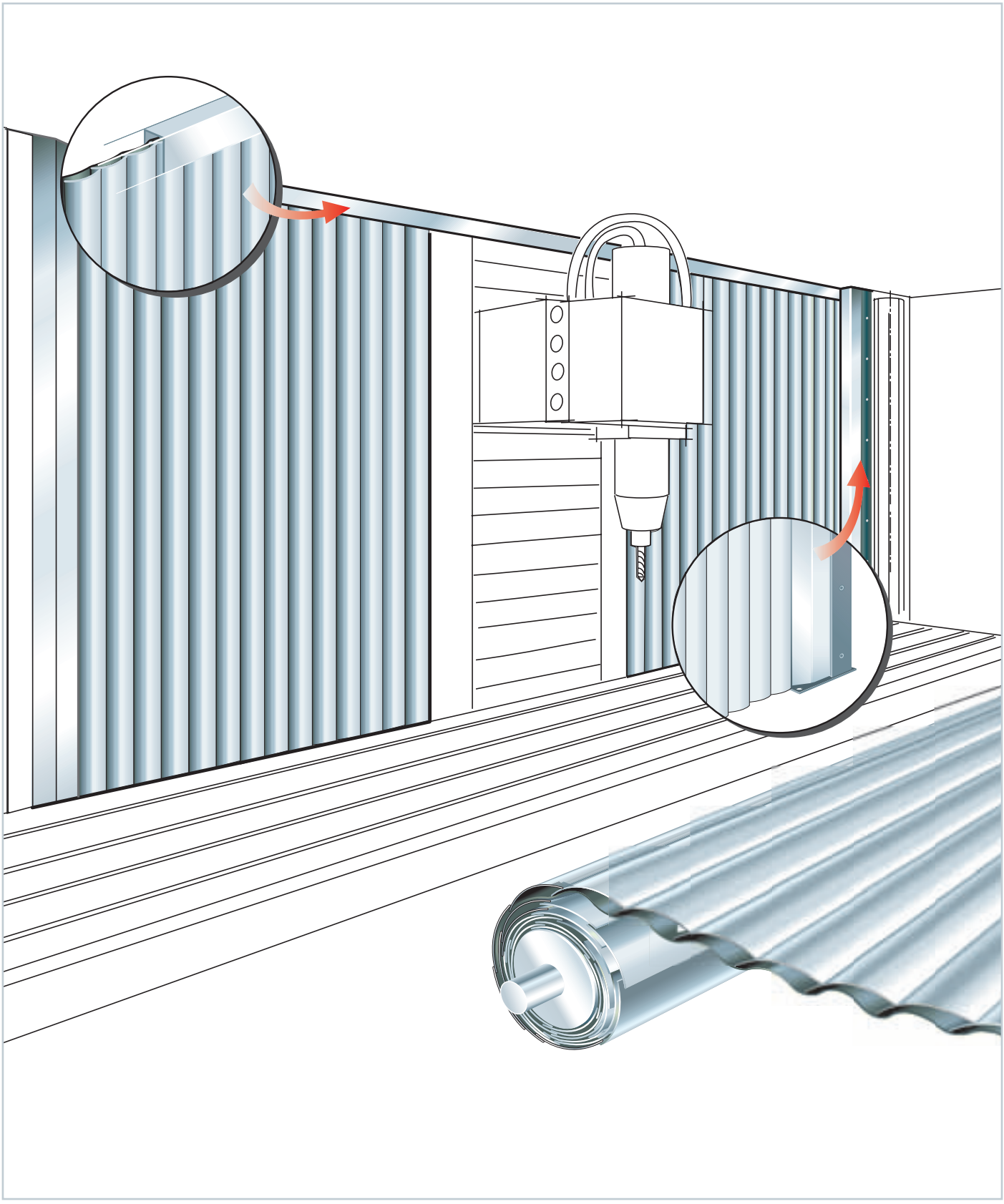
- The **X-Y 4R SHIELD** is a truly effective solution to the problem that occurs in horizontal machining centers when separating the tool working area from the motor area. The protective wall of the **X-Y 4R SHIELD** encloses and seals the machine, while at the same time allowing the spindle to move freely in all directions.
- The **X-Y 4R SHIELD** uses four **SURE-SPRING**® roll-up covers, making the system very sturdy and reliable, even for the fastest machine tools on the market.
- **X-Y 4R SHIELDS** are designed for acceleration up to 1.5 g and speeds up to 90 m/min. Special designs are required for higher accelerations and speeds.
- The modular system is designed to the customer's specifications, allowing rapid assembly of the machine. Its simple design makes maintenance and inspection easy.

Special Product: X-Y SP SHIELD



- The **X-Y SP SHIELD** is the most reliable system for protecting the working area in horizontal spindle machining centers where there is a large production of hot shavings. Unlike to the **X-Y 4R SHIELD**, this system mounts a **SHEET-POCKET™** steel cover on the Y-axis (see page 6).
- We can guarantee this system for accelerations up to 1 g and speeds up 60 m/min. Contact our engineering department for higher speed applications.
- This system also offers all of the advantages of the **X-Y 4R SHIELD**.

Special Product: ARMOR BAND



Special Product: ARMOR BAND

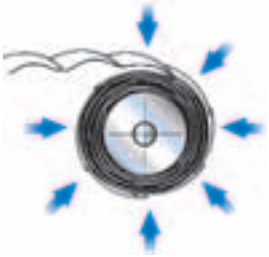
Technical Characteristics

The protective plates are made of stainless steel, which is unaffected by chip-induced wear.

Waterproof rear belt allows containment of liquids.

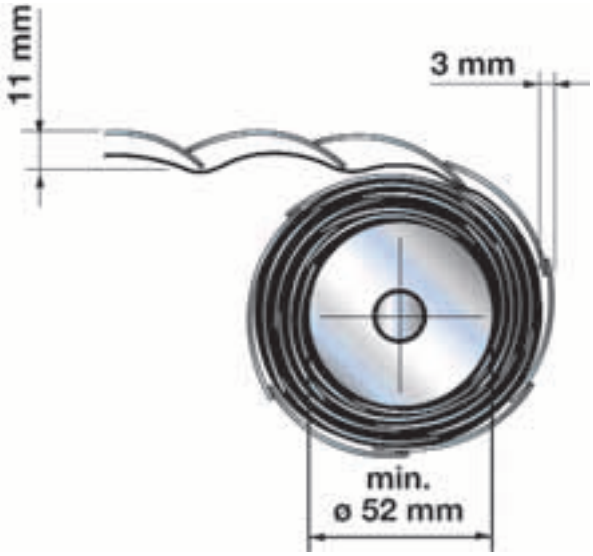
The protective plates are cleaned with a steel scraper unaffected by warm chips.

The curved geometry of the protective plates gives a high degree of transverse rigidity.



Drastic reduction of space requirements on the medium-long strokes.

The curved geometry of the protective plates allows them to adhere to the winding roller.



Thickness of extended belt: . . . . . **11 mm**

Belt thickness during winding: . . . . . **3 mm**

Minimum winding diameter: . . . . . **52 mm**

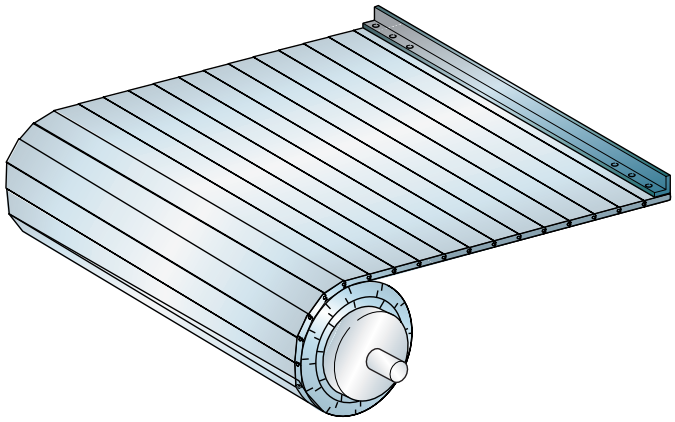
Translation speed up to . . . . . **120 m/min**

Lifetime guaranteed: . . . . . **2 million movements**

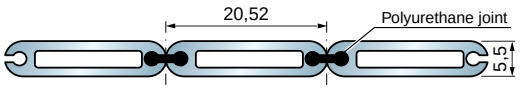
Belt weight: . . . . . **3 kg/m^2**

(Patent Pending)

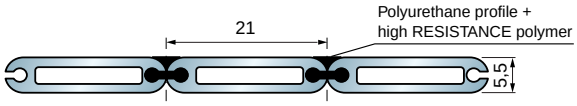
FLEXIBLE ALUMINUM COVERS



AKS - 1

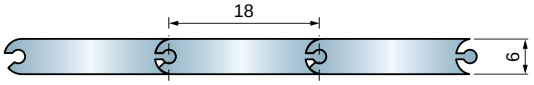


AKS - 2 (Patent pending)

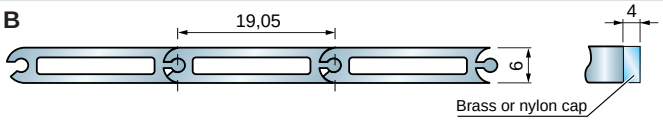


LOW NOISE - CLEANING BY WIPER

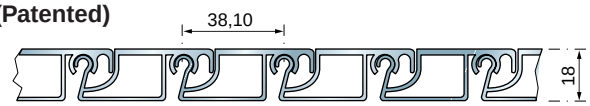
A



B

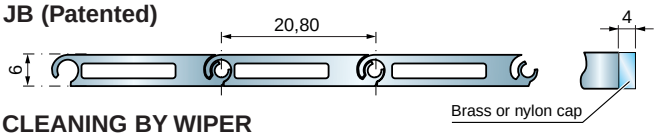


J (Patented)

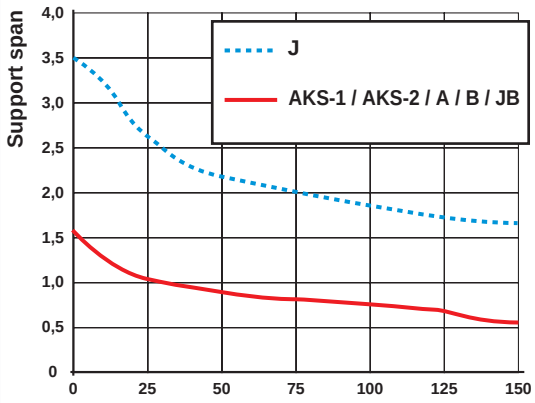


CLEANING BY WIPER

JB (Patented)



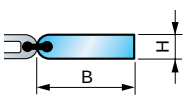
CLEANING BY WIPER



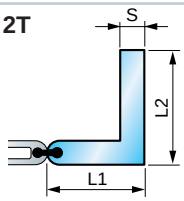
Code	Material	Minimum winding diameter (mm)		Max. feasible width (mm)	weight Kg/m²
		With upper roller	With lower roller		
AKS-1	Anodized grey aluminum	50	50	6000	9,0
AKS-2	Anodized grey aluminum	120	50	6000	9,0
A	Natural aluminum	350	60	6000	15,6
B	Natural aluminum	/	60	6000	10,0
J	Anodized grey aluminum	150	150	6000	12,5
JB	Anodized grey aluminum	/	60	6000	9,5

Standard end mount profiles:

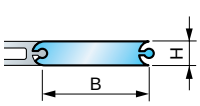
1T



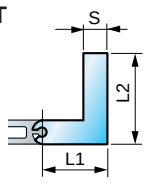
2T



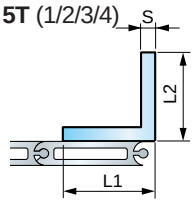
3T



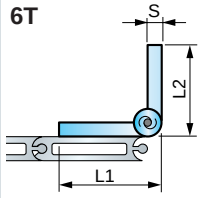
4T



5T (1/2/3/4)



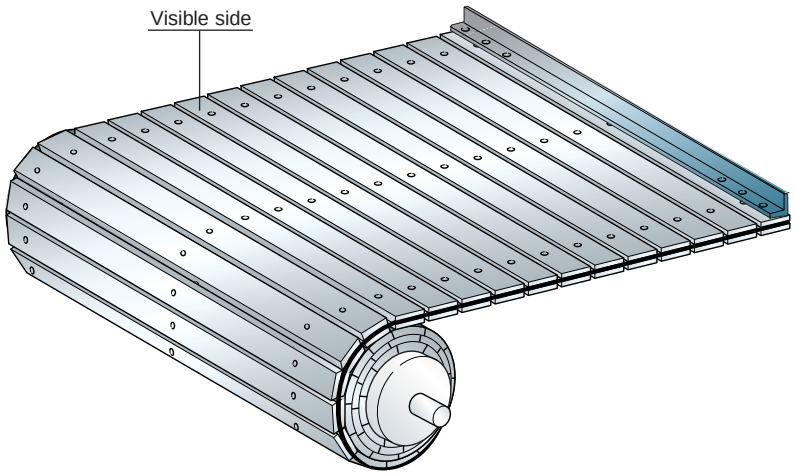
6T



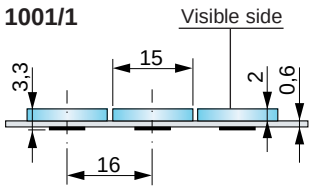
Terminal code	L1xL2xS	BxH	Material	Description	Cover code
1 T		25x5,5	Al	Flat	AKS-1 / AKS-2
2 T	20x30x5,5		Al	Corner	AKS-1 / AKS-2
3 T		20x6	Al	Cover code A	A / B
4 T	17x26x6		Al	Corner	A / B
5 T/1	15x15x3		Al-Stl	Corner	JB
5 T/2	20x20x3		Al-Stl	Corner	JB
5 T/3	30x30x3		Al-Stl	Corner	J / JB
5 T/4	40x40x5		Stl	Corner	J
6 T	30x30x2		Stl	Hinged	AKS-1/AKS-2/A/B/JB
Al= Aluminum Stl= Steel					

We can provide end mountings to match customer drawings upon request.

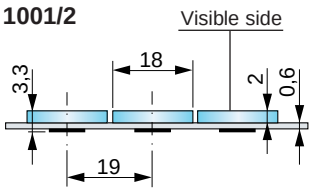
RIVETED APRON COVERS



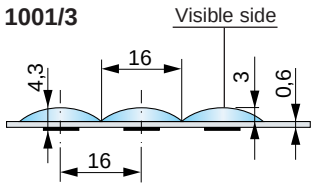
1001/1



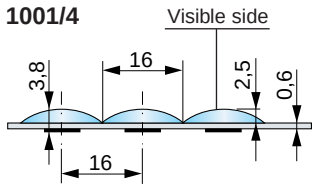
1001/2



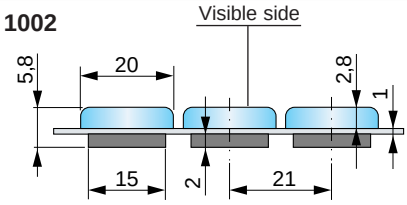
1001/3



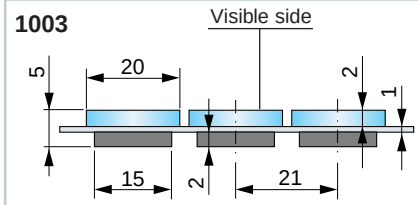
1001/4



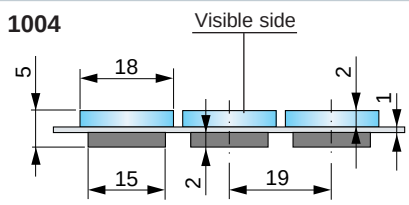
1002



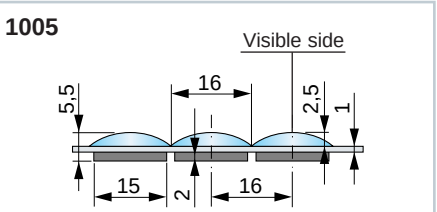
1003



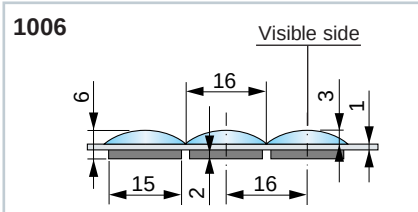
1004



1005



1006

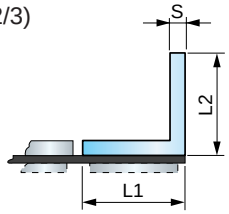


Code	Possible combinations of materials		Minimum winding diameter (mm)		Max. feasible width (mm)
	Upper elements	Lower elements	With upper roller	With lower roller	
1001/1	Al-Ac-Ot		50	30	2000
1001/2	Al-Ac-Ot		70	30	2000
1001/3	Al		70	30	2000
1001/4	Ac		70	30	2000
1002	Al	Al-Ac-Ot	40	40	2000
1003	Al-Ac-Ot	Al-Ac-Ot	70	40	2000
1004	Al-Ac-Ot	Al-Ac-Ot	60	40	2000
1005	Ac	Al-Ac-Ot	70	50	2000
1006	Al	Al-Ac-Ot	70	50	2000

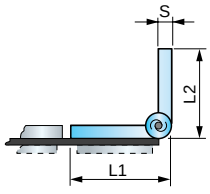
Al= Aluminum Stl= Steel Br= Brass

Standard end mount profiles:

5 T (1/2/3)



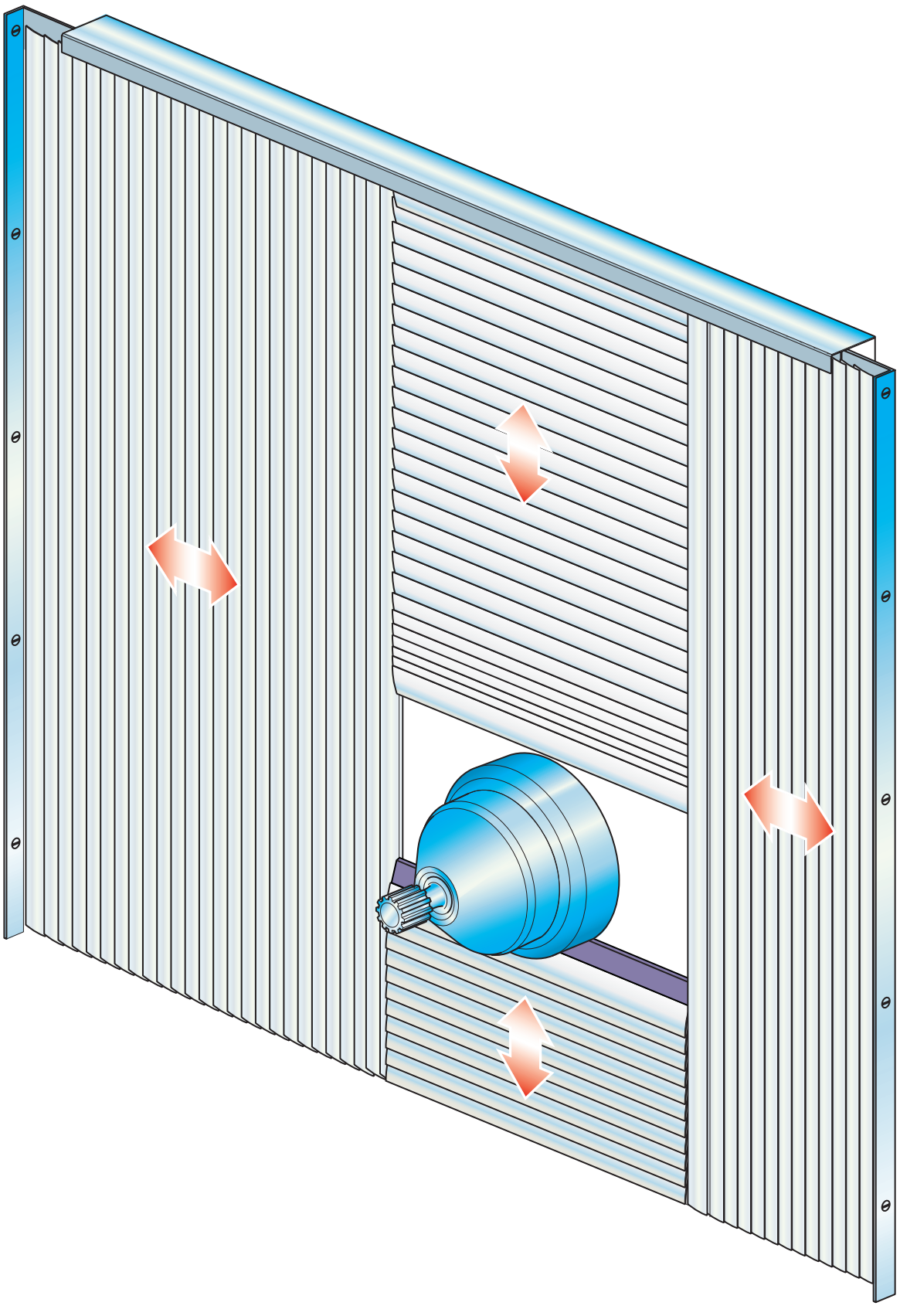
6 T



Code	L1xL2xS	Material
5T/1	15x15x3	Al - Ac
5T/2	20x20x3	Al - Ac
5T/3	30x30x3	Al - Ac
6T	30x30x2	Stl hinge

We can provide end mounts to match customer drawings upon request.

Special Product: X-Y LM SHIELD (Movable plates)



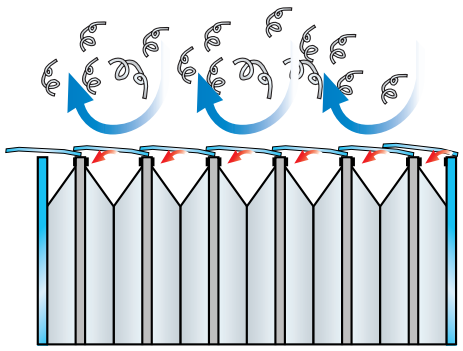
Special Product: X-Y LM SHIELD (Movable plates)

• The X – Y LM SHIELD (Movable plates) 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.

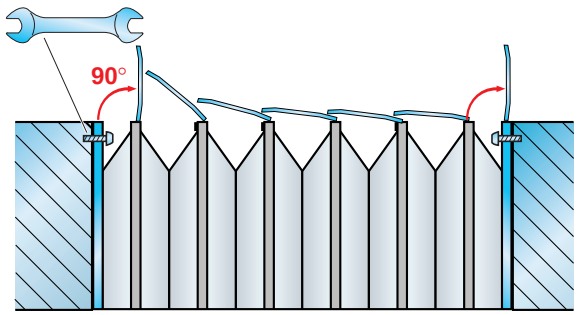
• We can guarantee this system for accelerations up to 1.5 G and speeds up 120 m/min. Contact our engineering department if higher performance is required.

• This system also offers all of the advantages of the X-Y 4R Shield.

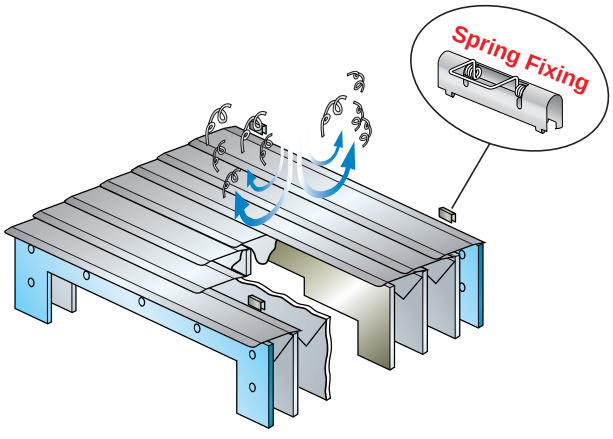
• The thermic-welded protection bellows are largely used on every kind of machine tool. They are frequently used in machining centers and chip-removing machines. In order to protect the bellow exposed to hot shavings, a shielding made by metal elements, called “plates” will be necessary.
For meeting the needs of fastening the plates, the P.E.I. Group presents an effective solution at competitive prices.
The “Spring Fixing” fastening system, with registered patent application, is composed by springs housed in special clamps keeping the plates adherent and loaded one on the other to prevent contaminants and shavings from entering and to allow a rotation up to 90° for making the fastening of the bellow flanges to the machine tools easier.



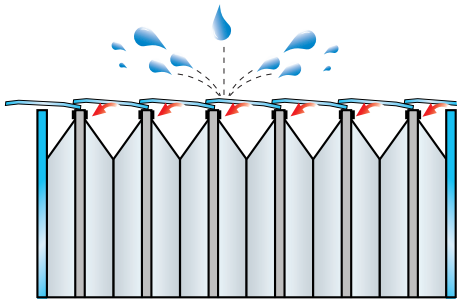
The “Spring Fixing” fastening system keeps the plates adherent and loads them one on the other to prevent contaminants and shavings from entering.



The rotation of plates up to 90° makes the fastening of the bellow flanges to the machine tool easier.

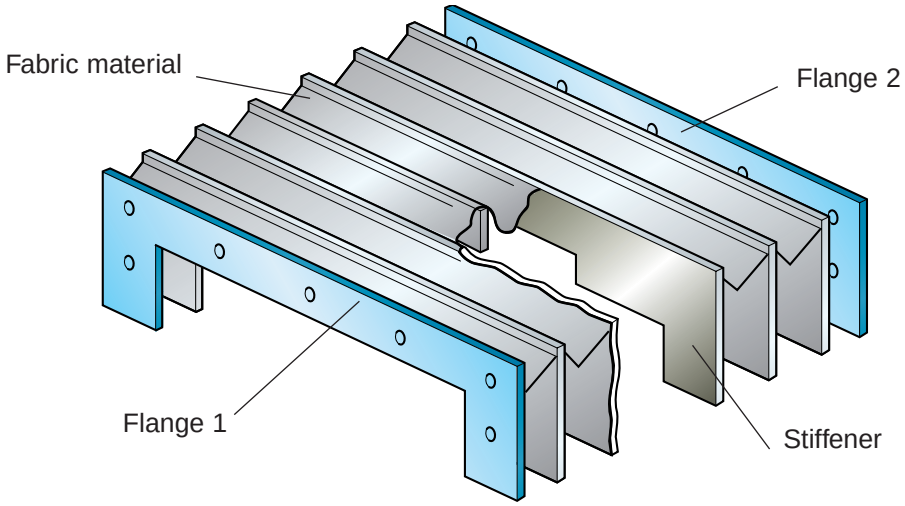


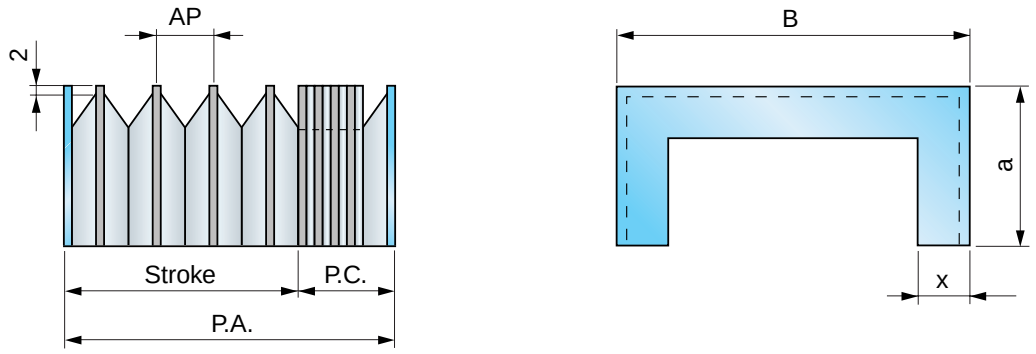
The protection plates are made in stainless steel resistant to wear caused by shavings.



The bellow is liquid-proof.

THERMIC-WELDED COVER





P.A. = Open length
P.C. = Closed length
Stroke = Open length - closed length

B = Outside width
a = Outside height
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 = $\frac{P.A.}{AP} + 2$

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

* See materials list on page 30

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

Example:

Data: Fold height = 15 mm
Open length = 1000 mm

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

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

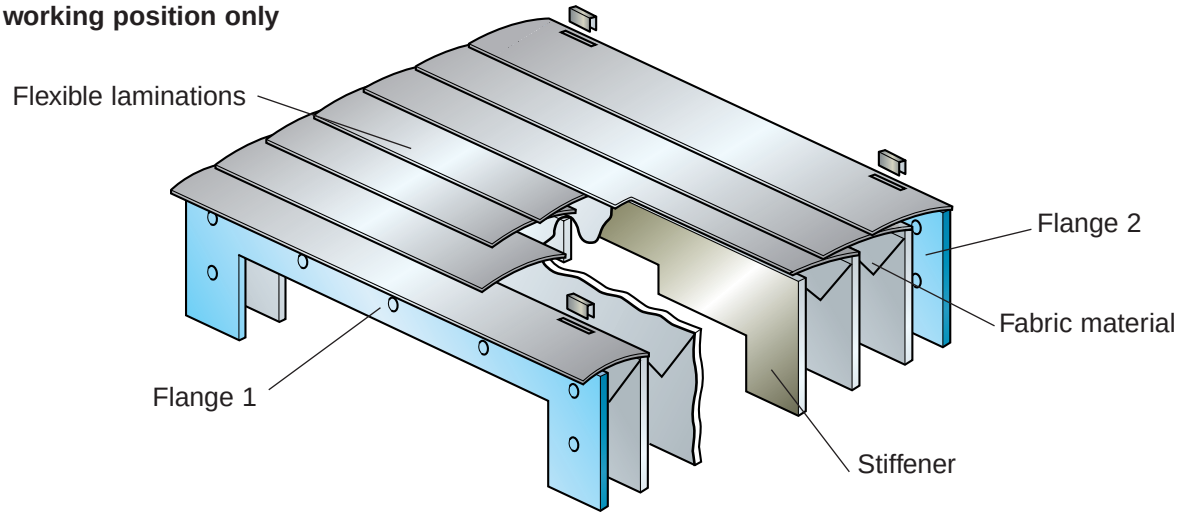
Closed length = (0,25* x 8 + 1**) x 48 + (2 *** x 2)
Closed length = 3 x 48 + 4 = 148

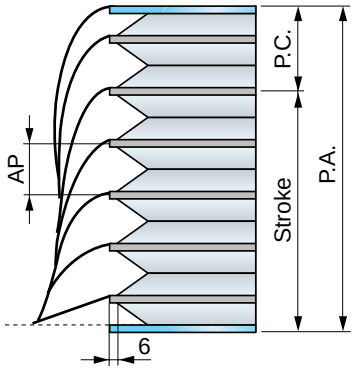
Closed length = 148 mm

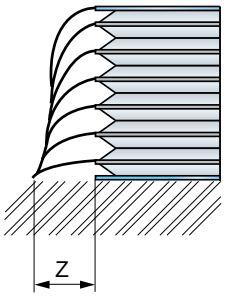
* We hypothesize the fabric material with code "TEMAT015" (see materials list on page 30)
** We hypothesize that the stiffener is 1 mm thick
*** We hypothesize that the flange is 2 mm thick (see materials list on page 30)

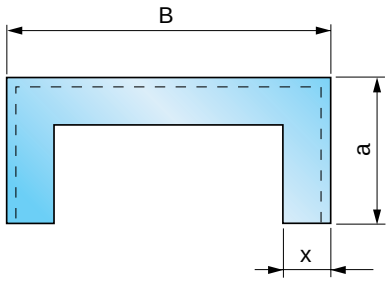
THERMIC-WELDED COVER WITH FLEXIBLE LAMINATIONS

Vertical working position only









P.A. = Open length
P.C. = Closed length
Stroke = Open length - closed length

B = Outside width
a = Outside height
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

AP = Opening of 1 fold = (x·2) - 16
SM = Fabric thickness *
SS = Stiffener thickness *
SF = Flange thickness *

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

P. C. = (SM · 8 + SS) · NP + (SF · 2)

* See materials list on page 30

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

Example:
Data: Fold height = 30 mm
Open length = 1000 mm

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

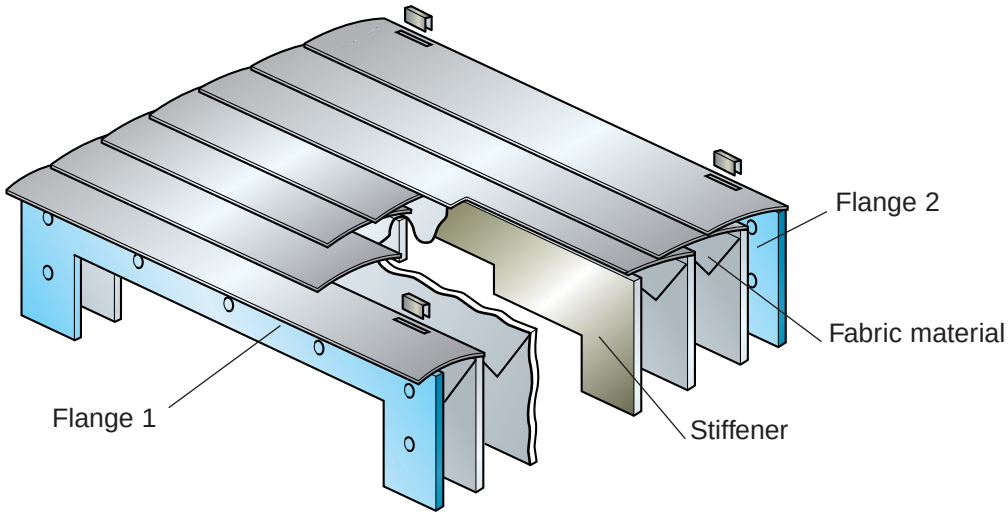
Number of folds = $\frac{1000}{44} + 2 = 25$

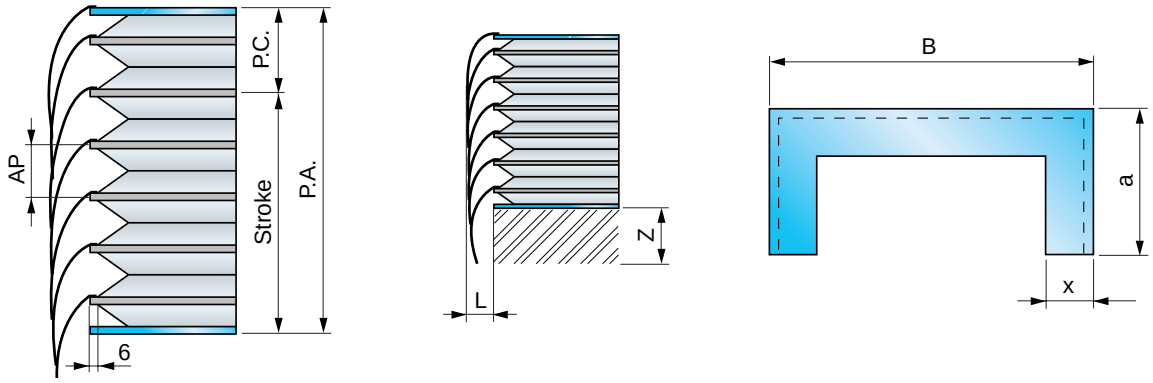
Closed length = (0,25* x 8 + 1**) x 25 + (2*** x 2)
Closed length = 3 x 25 + 4 = 79
Closed length = 79 mm

* We hypothesize the fabric material with code "TEMAT015" (see materials list on page 30)
** We hypothesize that the stiffener is 1 mm thick
*** We hypothesize that the flange is 2 mm thick (see materials list on page 30)

THERMIC-WELDED COVER WITH FIXED LAMINATIONS

Working position:
Horizontal
Vertical
Frontal





P.A. = Open length
P.C. = Closed length
Stroke = Open length - closed length
B = Outside width
a = Outside height
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= $\frac{P.A.}{AP} + 2$

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

* See materials list on page 30

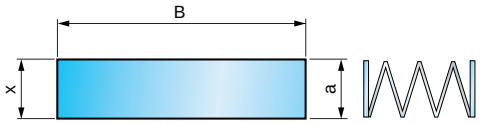
This data sheet shows only one type of Thermic-Welded Cover that we manufacture.
Contact our engineering department for other types.

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

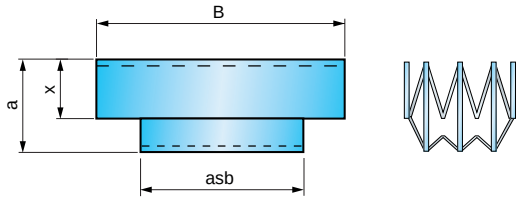
* We hypothesize the fabric material with code "TEMAT151" (see materials list on page 30)
** We hypothesize that the stiffener is 1 mm thick
*** We hypothesize that the flange is 2 mm thick (see materials list on page 30)

STANDARD SHAPES

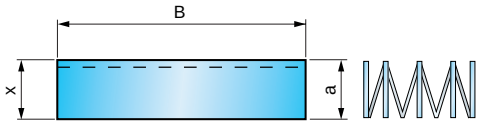
UL-OS



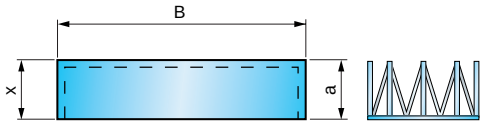
UL-2ST



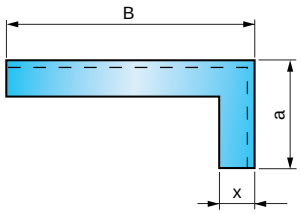
UL-1S



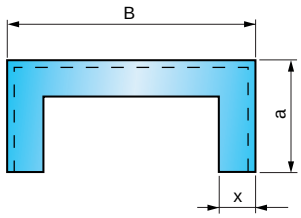
UL-3S



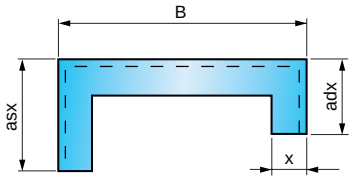
DL-DXC



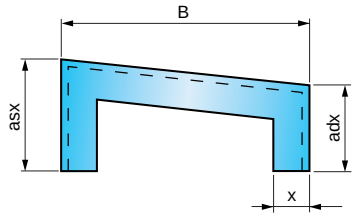
TL-SIM



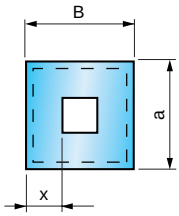
TL-DXC



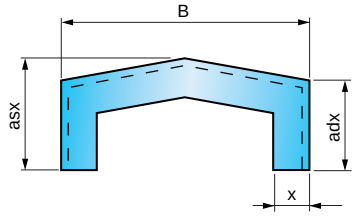
TL-DXI



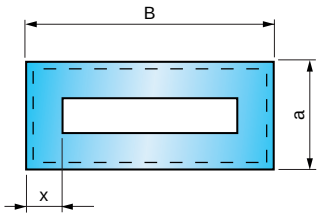
QL-QUAD



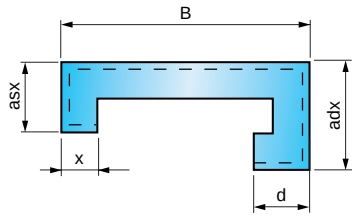
QL-CAP



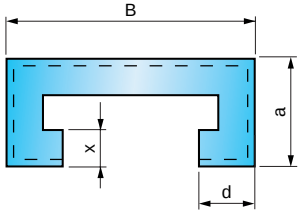
QL-RETT



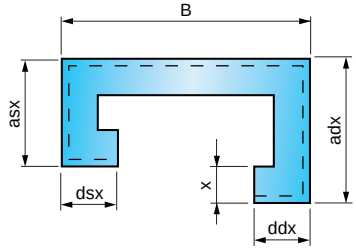
QL-ASI



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	Continuous 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	+190	-30	+140	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.

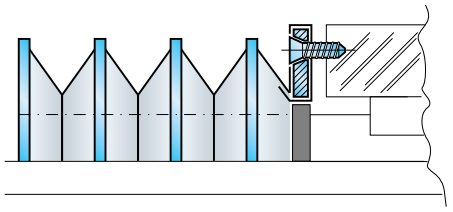
* Kevlar and Nomex are registered Dupont trademarks ** NOT recommended for Thermic-Welded Covers with laminations.

Contact our engineering department for other materials and applications.

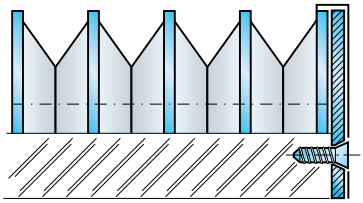
THERMIC-WELDED COVERS

FLANGE FASTENING SYSTEMS

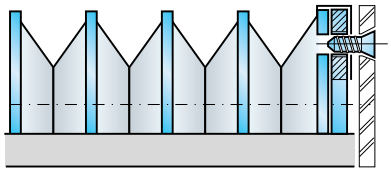
Type A
- Solution with sheet steel, aluminum or PVC flange
- Shape and holes per customer drawings



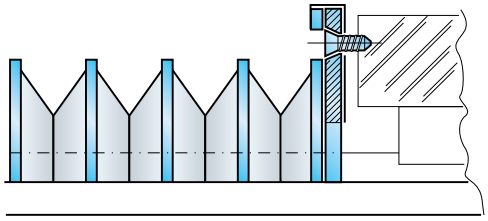
Type B
- Solution with sheet steel, aluminum or PVC flange
- Shape and holes per customer drawings



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

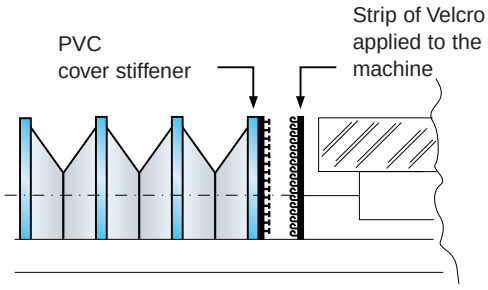


Type D
- Solution with connector flange protruding from the cover profile, made of sheet steel, aluminum or PVC
- Shape and holes per customer drawings



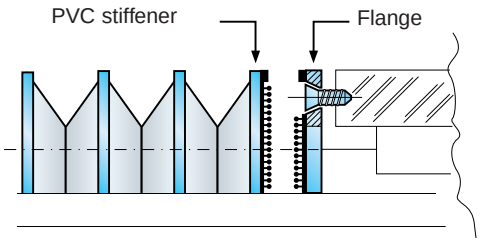
Type E
Solution with rapid VELCRO connection.
A PVC support acts as a flange, with VELCRO strips applied to the stiffener and directly to the machine.
This solution offers two main advantages:
- Rapid application and removal of the cover
- Low cost

* Recommended for dry work environments



Type F
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 two main advantages:
- Rapid application and removal of the cover
- Foam gasket strip provides a tight seal around the connection

* Recommended for wet work environments



The above are standard fastening methods for Thermic-Welded Covers. Other types available upon request.

QUESTIONNAIRE FOR THERMIC-WELDED COVERS

! Type of machine on which the COVERS are to be installed:
- ❑ METAL working machine
- ❑ MARBLE working machine
- ❑ GOLD working machine
- ❑ PAPER working machine
- ❑ FABRIC working machine
- ❑ GLASS working machine
- ❑ FOOD working machine
- ❑ PHARMACEUTICAL working machine
- ❑ AGRICULTURAL working machine
- ❑ TANNING working machine
- ❑ CLAY working machine
- ❑ WOOD working machine
- ❑ Other .....

! Type of material falling on the covers:
- ❑ Steel shavings
- ❑ Cast iron shavings
- ❑ Brass shavings
- ❑ Aluminum shavings
- ❑ Wood shavings
- ❑ Ambient dust
- ❑ Grinding swarf
- ❑ Welding splatter
- ❑ Other .....

! Liquids to which the covers will be exposed:
- ❑ Water/steam
- ❑ Coolant/oils
- ❑ Oils with a viscosity of ISO .....
- ❑ Other .....

! Amount of material falling on the covers: .....Kg

! Temperature of material falling on the covers:.....°C

! Temperature of work area: .....°C

! Max. rapid travel speed: .....m/min.

! Max. acceleration: .....g

! Max. working motions per hour: .....

! Max. daily working hours: .....

! Type of cover: ❑ Thermic-Welded ❑ Thermic-Welded with fixed laminations ❑ Thermic-Welded with flexible laminations

Working position: ❑ Horizontal ❑ Vertical ❑ Frontal

Cover shape: ❑ UL-OS ❑ UL-3S ❑ TL-DXC ❑ QL-CAP
❑ UL-1S ❑ DL-DXC ❑ TL-DXI ❑ QL-RETT ❑ CL-SIM
❑ UL-2ST ❑ TL-SIM ❑ QL-QUAD ❑ QL-ASI ❑ CL-ASI

TEMAT Fabric material: ❑ 091 ❑ 106 ❑ 015 ❑ 151 ❑ 164 ❑ 165 ❑ 169 ❑ 017 ❑ 020

Stiffener material: ❑ PVC 0,5 ❑ PVC 1,0 ❑ PVC 1,5

Flange material: ❑ AL 2,0 ❑ AL 3,0 ❑ AC 2,0 ❑ AC 3,0 ❑ AC 4,0
❑ PVC 2,0 ❑ PVC 3,0

Lamination material: ❑ AL ❑ STAINLESS

Flange 1 connection system: ❑ A ❑ B ❑ C ❑ D ❑ E ❑ F

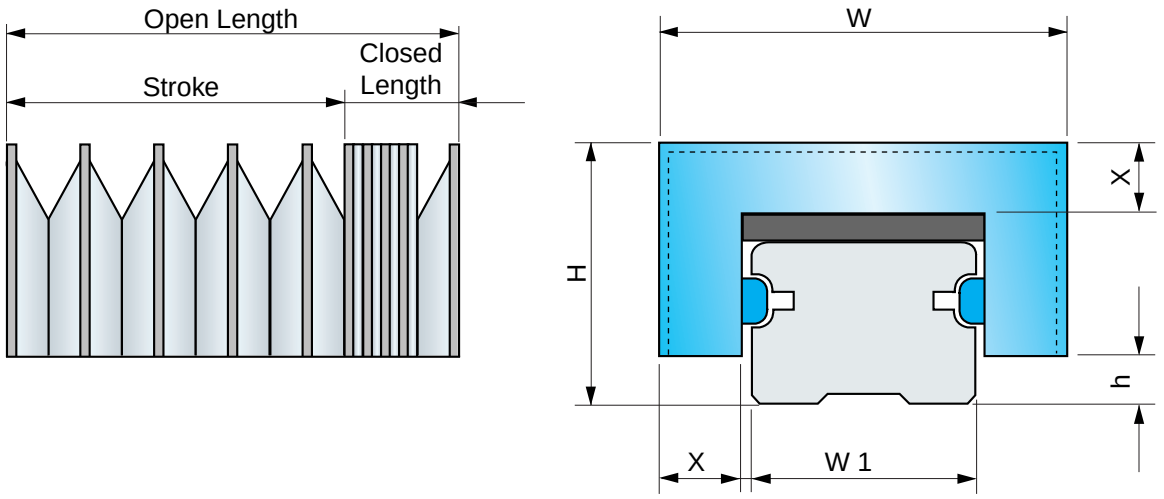
Flange 2 connection system: ❑ A ❑ B ❑ C ❑ D ❑ E ❑ F

! P.A.= Open length..... mm
P.C.= Closed length .....mm
Stroke= ..... mm
a= Outside height.....mm
B= Outside width .....mm
x= Fold height .....mm
adx= Outside height, rt. .....mm
asx= Outside height, lt. .....mm
d= Return .....mm
ddx= RT. return .....mm
dsx= LT. return .....mm
asb= Overall drive dimensions .....mm
L= Lamination height .....mm
Z= Overall lamination dimensions .....mm

! Company name: .....
Contact person: .....
Tel.: .....**Fax:** .....
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.

THERMIC-WELDED COVERS FOR LINEAR SLIDES



Example of bellows mounted on linear slides

LIST OF STANDARD MATERIAL

Code	Support	Hood	Closed length for 1000 mm of open length	Availability
S1	PVC 0,50	PVC + Polyester + PVC 0,25 (TEMAT020)	90	Ready to deliver
P1	PVC 0,50	Polyurethane + Polyester + Polyurathane 0,25 (TEMAT015)	90	Ready to deliver
LX	PVC 1,00	Panox/Kevlar Polyurethane + Polyurethane 0,33 (TEMAT169)	150	On request

STANDARD THERMIC-WELDED COVERS SIZE

Slide nominal value W1	Ply height X	Bellows width W	Total height H	Slide deviation 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

For the W1 slide size of 55 and 65, please contact our Technical Dept.

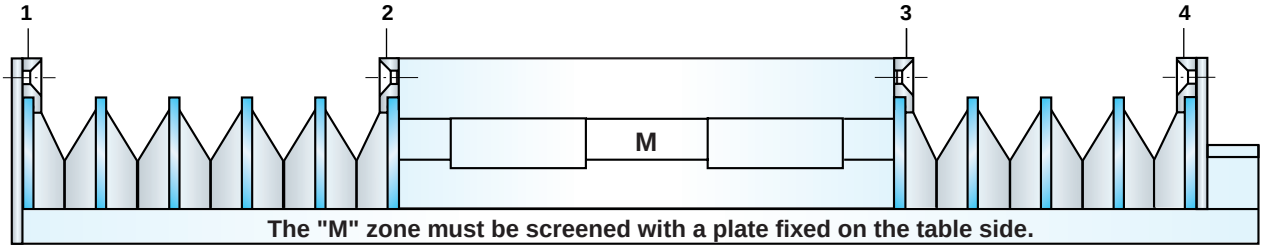
EXAMPLE of the identification code of a bellows

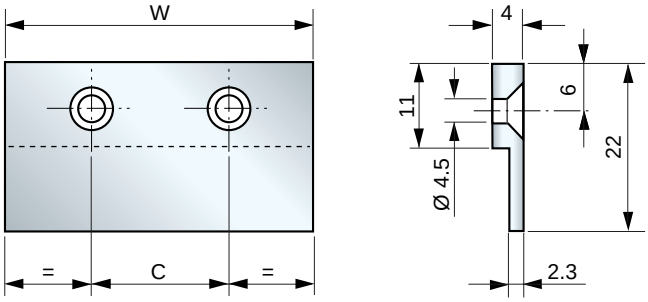
Slide manufacturer	**INA**
Slide model	**KUE**
Slide nominal value (W1)	**35**
Open length (stroke + closed length)	**1250**
Type of material	**S1**

Thermic-Welded Covers Standard Systems for Linear Slides

Solution A: Fastening holdfast

Bellows-fastening standard systems for linear slides



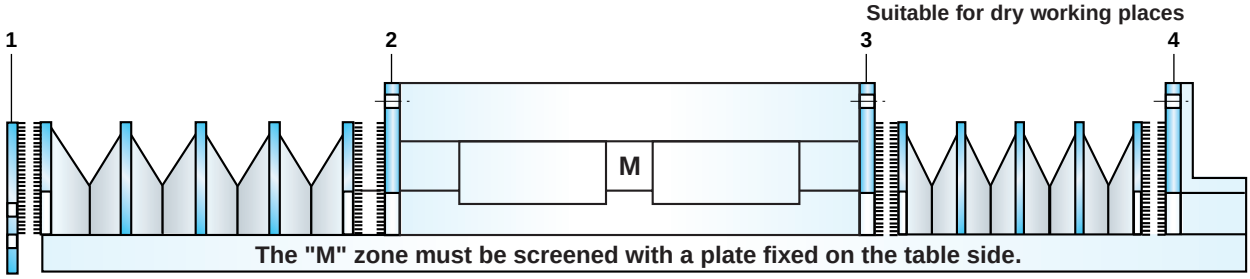


SLIDE	W	C	N. HOLES
15	52	26	2
20	57	29	2
25	63	32	2
30	68	34	2
35	72	36	2
45	83	28	3
55	104	35	3
65	128	32	4

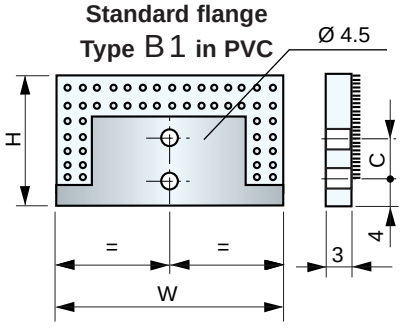
Suitable for bellows fastening in positions 1 - 2 - 3 - 4,
with angular or plate supports provided by customers

Solution B: Velcro flange fastening (B1 e B2)

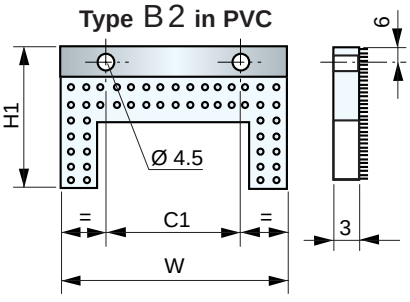
Suitable for dry working places



Standard flange Type B1 in PVC



Standard flange Type B2 in PVC



SLIDE	W	H	C	H1	C1	No. 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 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.

THERMIC-WELDED COVERS

Standard Production of Thermic-Welded Covers for Linear Slides

Manufacturer slide	Slide model	Availability
FRANKE	FDK...	• • •
HIWIN	AGH...	• • •
	LGH...	• • •
	LGW...	• • •
	LGR...	= = =
IKO	LWE...	• • •
	LWH...	• • •
	LRX...	= = =
	JHS...	= = =
INA	KUE...	• • •
	KUSE...	• • •
	KUVE...	• • •
	RUE...	• • •
	TKD...	= = =
	TKSD...	= = =
	TKVD...	= = =
NSK	LH...	• • •
	L1H...	• • •
	LS...	= = =
	LY...	= = =
SBG	...	• • •
SCHNEEBERGER	MRA...	• • •
	MRB...	• • •
SKF	LLBHS...	• • •
STAR	1605...	• • •
	1805...	• • •
THK	HSR...	• • •
	SHS...	• • •
	SR...	• • •
	SSR...	• • •
	HCR...	= = =
	HRW...	= = =
	SNS...	= = =
TSUBAKI	H...	• • •

Key to symbols

• • • **Type S1 and P1 standard bellows (ready to deliver)**

= = = **Bellows manufactured on request**

Example of the identification code of a bellows for linear slides equipped with flanges

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

Note: On request we can provide bellows for every kind of slide. For more detailed information, contact our technical department.

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** .....

Contact person: .....

Phone: .....

Fax: .....

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.

DURATITE ™: BELLOWS FOR LIFT - TABLES

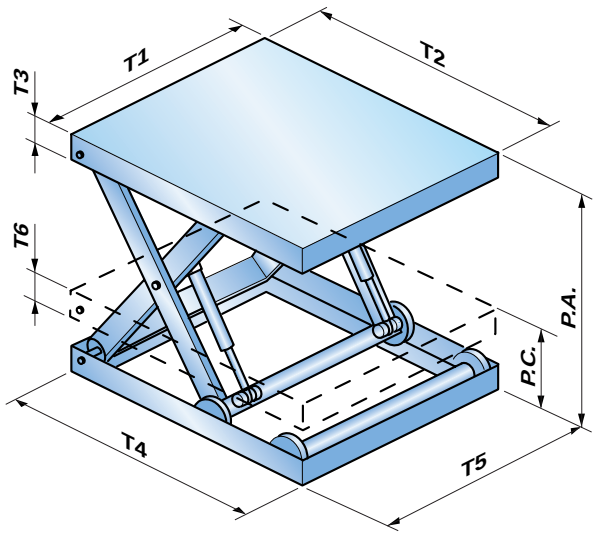
- **COVER MOVEMENTS OF LIFT MECHANISM**
- **PROTECTION FROM DUST, DIRT, AND FOREIGN OBJECTS**

TECHNICAL FEATURES

- Rigid sides without stitching or metal wires
- Easy cleaning
- Easy installation
- Resistance to wear
- Reinforced ends to ensure a long lasting fixing
- Vents to allow uniform air flow during operation
- Tie strips to give a better functioning in opening and closing
- Colours: Black and Yellow or Black
- Great appearance

(patent pending)

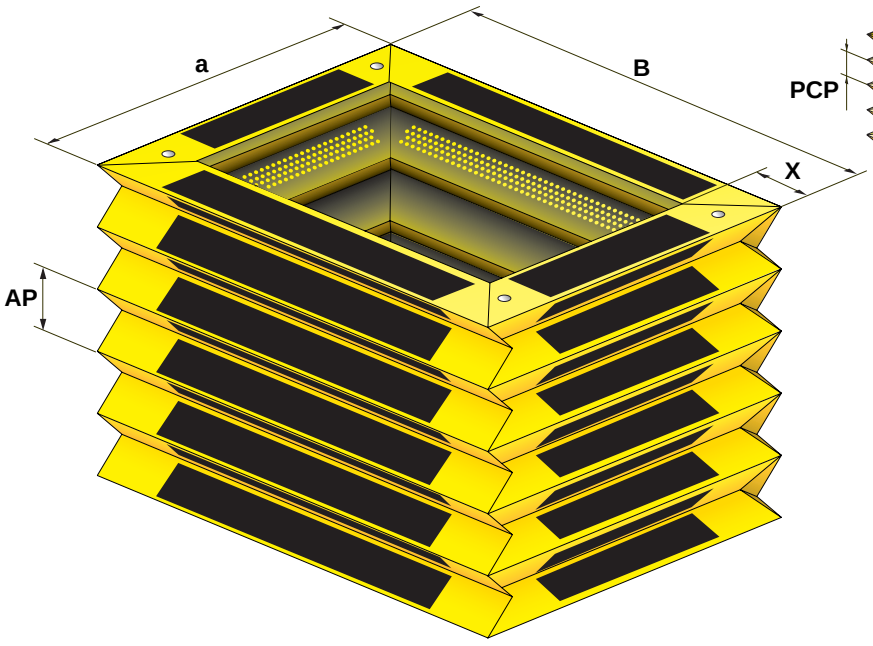
INFORMATION ON THE HOISTING PLATFORM

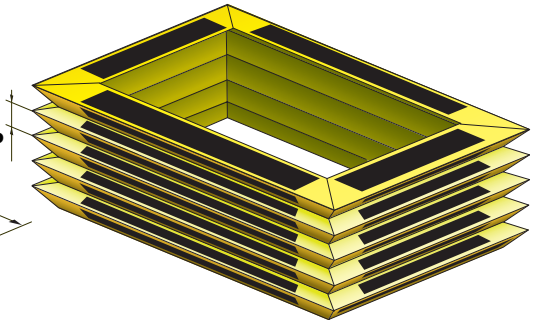


PLATFORM DIMENSIONS

Upper side
T1 = table width
T2 = table length
T3 = frame height
Lower side
T4 = table width
T5 = table length
T6 = frame height
Opening
P.A. = Open length
Closing
P.C. = Closed length

CHARACTERISTICS OF BELLOWS DURATITE ™





Formula for calculating the CLOSED LENGTH

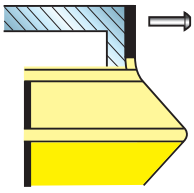
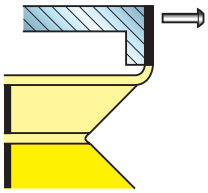
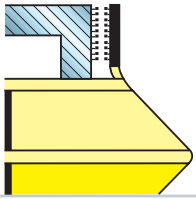
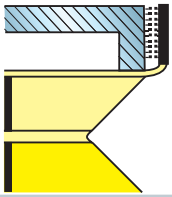
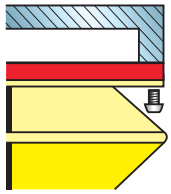
P.C. = NP • PCP + 10 mm

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

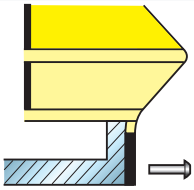
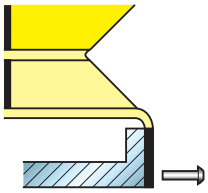
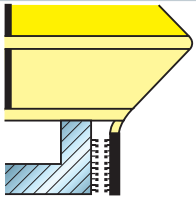
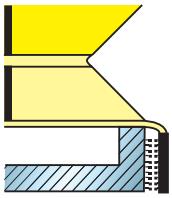
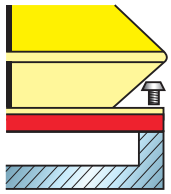
X	AP	PCP	Material	Color	Reference code
38	55	10	PVC/PU	Yellow/Black	DM-PU-G
			PVC/PU	Black	DM-PU-N
67	100	10	PVC	Yellow/Black	DM-PU-G
			PVC	Black	DM-PU-N
89	125	10	PVC	Yellow/Black	DM-PU-G

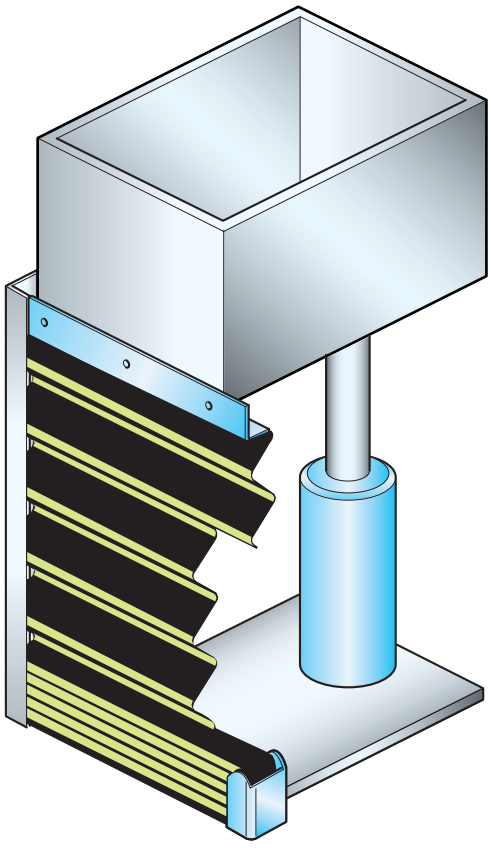
Standard System for fastening DURATITE ™ Covers

Upper part

				
DCI1 = Bellows inner collar. Suitable for screw fastening.	**DCE1** = Bellows outer collar. Suitable for screw fastening.	**DVI1** = Bellows inner VELCRO collar. Suitable for quick fastening.	**DVE1**= Bellows outer VELCRO collar. Suitable for quick fastening.	**DFL1** = Customised flange fastening system. Suitable for special applications.

Lower part

				
DCI2 = Bellows inner collar. Suitable for screw fastening.	**DCE2**= Bellows outer collar. Suitable for screw fastening.	**DVI2** = Bellows inner VELCRO collar. Suitable for quick fastening.	**DVE2** = Bellows outer VELCRO collar. Suitable for quick fastening.	**DFL2** = Customised flange fastening system. Suitable for special applications.



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:

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

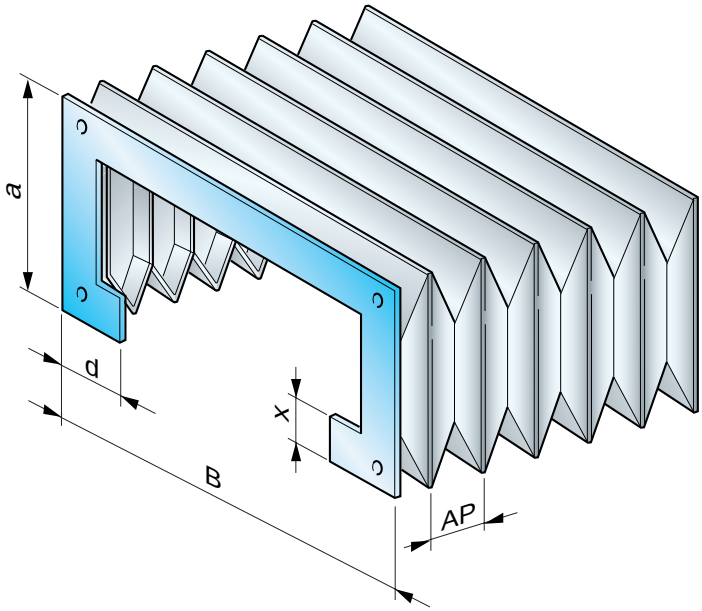
Upper side fastening type ❑DCI1 ❑DCE1 ❑DVI1 ❑DVE1 ❑DFL1

Lower side fastening type ❑DCI2 ❑DCE2 ❑DVI2 ❑DVE2 ❑DFL2

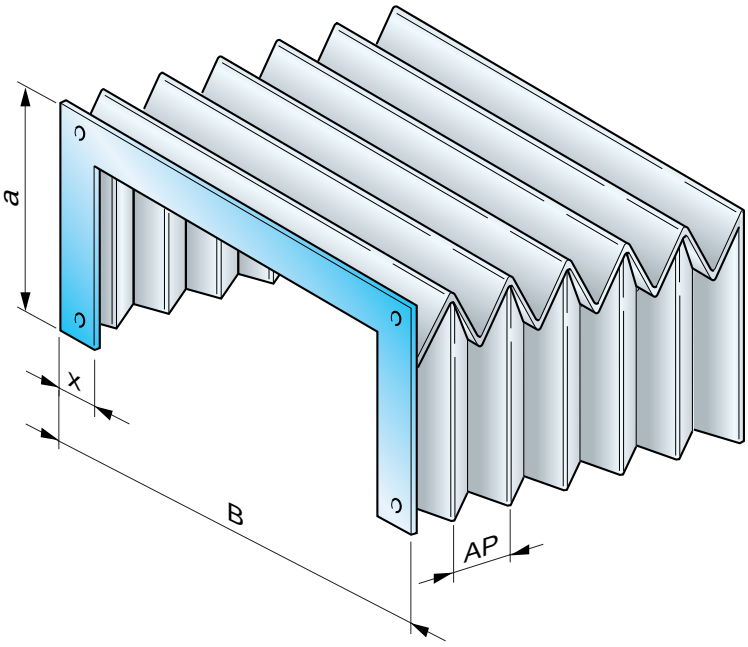
NOTE: The data fields and/or tables marked by ! are the least ones to be filled in order to give you a quotation.

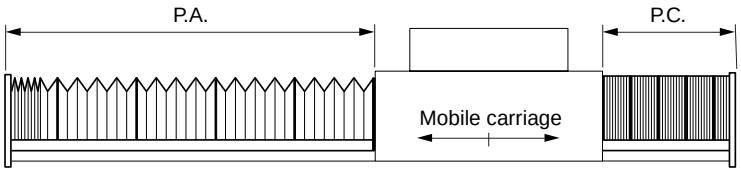
Special Product: FLAT COVERS GLUED AND SEWN

Type CL-SIM



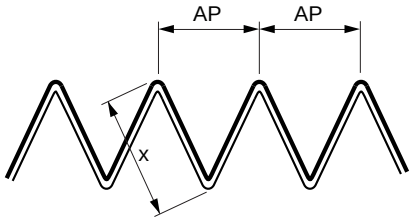
Type TL-SIM





Contact our engineering department for this type of cover.

Glued style "A"



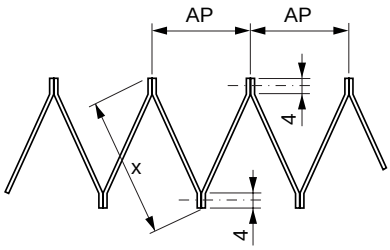
Formula for calculating the CLOSED LENGTH

P. C.= NP · 4 + lange thickness

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

AP= Opening of 1 fold = x · 1,41

Sewn style "C"



Formula for calculating the CLOSED LENGTH

P. C.= NP · 2,5 + flange thickness

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

AP= Opening of 1 fold = (x-8) · 1,41

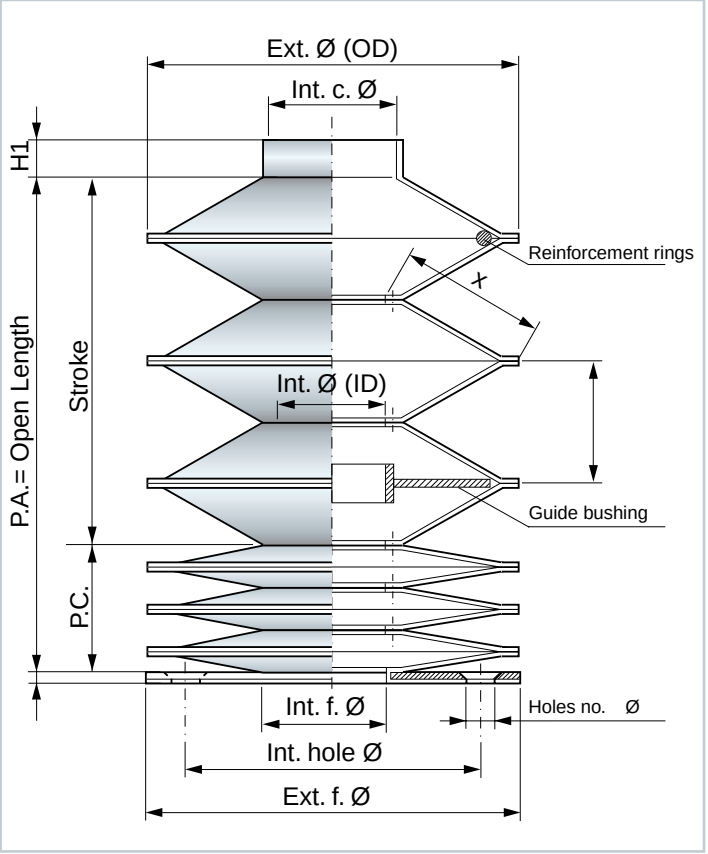
Ref.	Description	Dim.	Type	Style
! **P.A.**	Open length			
! **P.C.**	Closed length			
! **Stroke**	(P.A. - P.C.)			
! **a**	Outside height			
! **B**	Outside width			
! **x**	Fold height			
! **d**	Return dimension			
! **AP**	Fold opening			
! **NP**	Number of folds			

NOTE: The data fields and/or tables marked by ! are the least ones to be filled in order to give you a quotation.

HEAT-FORMED AND OPEN HEAT-FORMED BELLOWS

These are used when strong rotation resistance is required (for instance, to cover ball screws) and where a very compact closed pack is required.

- Highly **reliable** bellows
- High resistance to mechanical and dynamic **stress**
- Resistance to **coolants and oils**
- Suitable for **high temperatures**
- Available with guide **bushings** and reinforcement **rings**
- No tooling **costs**
- With selected edging (in safety colors upon request)
- Minimum internal diameter **starting at 20 mm**
- **Any size** external diameter
- Good **price/quality** ratio



Materials available:

- Polyester coated with Neoprene* and Hypalon*
- Polyester coated with Nitril rubber
- Polyester coated with Polyurethane
- Polyester coated with PVC
- Kevlar* coated with Neoprene* and Hypalon*
- Kevlar* coated with Polyurethane
- Fiberglass coated with Silicone and Neoprene*
- Fiberglass coated with PVC
- Aluminum-coated fabrics

* Neoprene, Hypalon and Kevlar are registered Dupont trademarks

(see materials list on page 46)

Formula for calculating the CLOSED LENGTH

P.C.= Closed Length = NP · SP*

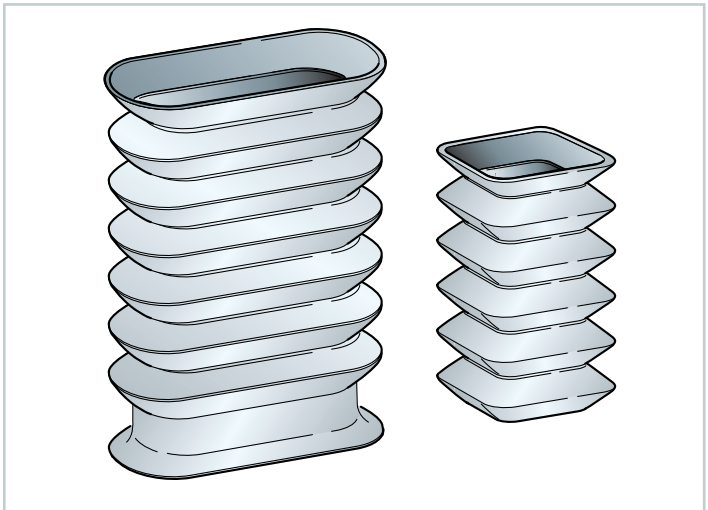
NP= Number of folds = $\frac{\text{P.A.}}{\text{AP}} + 1$

* **SP**= Thickness of 1 fold; see materials list on page 46

AP= Opening of 1 fold = $\left(\frac{\text{OD - ID}}{2} - 6\right) \cdot 1{,}2$

Note: When steel rings are required inside the folds, the **P.C.** is calculated by our engineering department.

VARIFLEX BELLOWS



- Extremely sturdy bellows
- Water and dust proof
- External diameter of up to 3000 mm
- Highly resistant to abrasion
- Weather resistant
- Good resistance to chemicals
- Suitable for temperatures of up to 300 °C
- Available with longitudinal seam for maintenance.

Materials available
Leather, rubberized fabric, aluminum-coated carbon fabric, etc.

Also available in oval and square shapes!

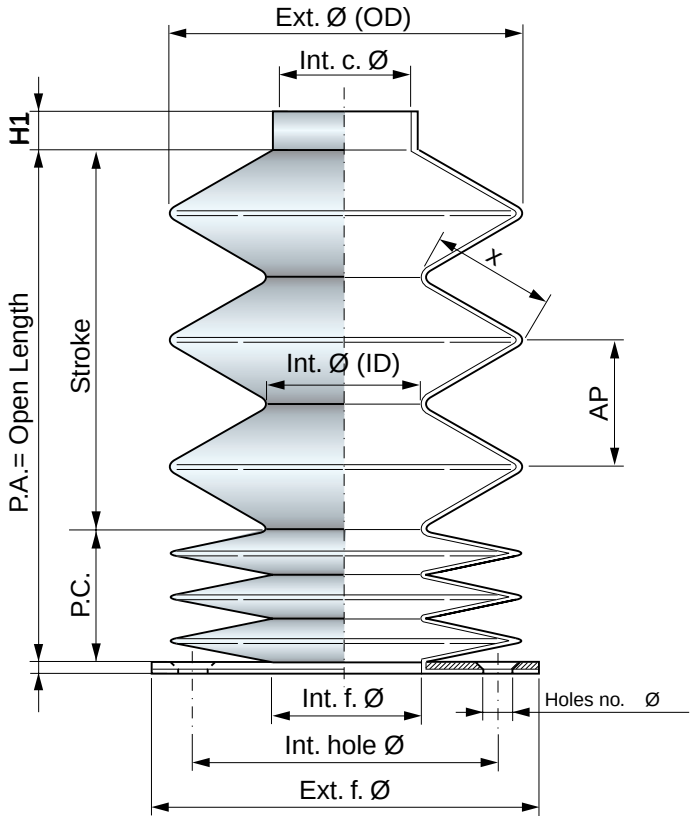
Dimensions to be determined with our engineering department.

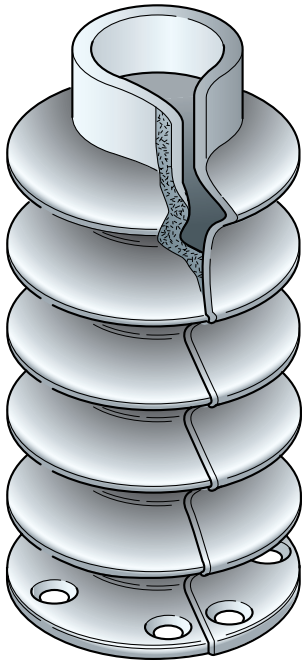
Round Bellows

Heat-Formed and Open Heat-Formed Bellows

These are used when high mechanical strength and heat resistance are required.

- Excellent resistance to mechanical **stress**
- Resistance to **coolants and oils**
- Available with guide **bushings** and reinforcement **rings** upon request
- Also available cone-shaped
- No tooling **costs**
- Suitable for **high temperatures**





With **longitudinal seam** upon request when the bellows must be disassembled without dismantling the part to be protected

Formula for calculating the CLOSED LENGTH

P.C.= Closed Length = NP · SP*

NP= Number of folds = $\frac{P.A.}{AP} + 1$

* **SP**= Thickness of 1 fold; see materials list on page 46

AP= Opening of 1 fold = $\left(\frac{OD - ID}{2}\right) \cdot 1{,}41$

Note: When steel rings are required inside the folds, the **P.C.** is calculated by our engineering department.

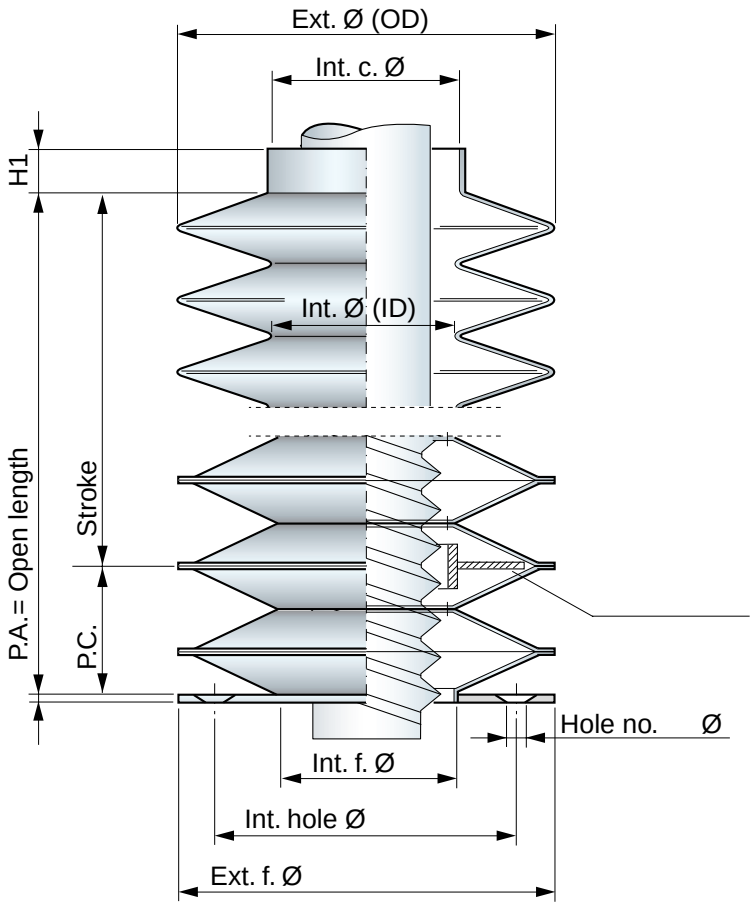
Materials available:

- Polyester coated with Neoprene* and Hypalon*
- Polyester coated with Nitril rubber
- Polyester coated with Polyurethane
- Polyester coated with PVC
- Fiberglass coated with Silicone and Neoprene*

* Neoprene and Hypalon are registered Dupont trademarks

(see materials list on page 46)

QUESTIONNAIRE FOR ROUND BELLOWS



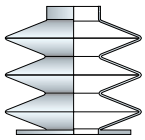
! Bellows type

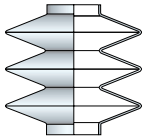
❑ Sewn

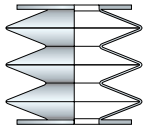
❑ Heat-formed

❑ Variflex

! Fastening system

❑ A 

❑ B 

❑ C 

! Type of machine on which the ROUND BELLOWS is to be installed:

❑ METAL working machine
❑ MARBLE working machine
❑ GOLD working machine
❑ PAPER working machine
❑ FABRIC working machine
❑ GLASS working machine
❑ FOOD processing machine
❑ PHARMACEUTICAL processing machine
❑ AGRICULTURAL processing machine
❑ TANNING machinery
❑ CLAY working machine
❑ WOOD working machine

❑ Other .....

! Type of material falling on the bellows:

.....
.....
.....
.....

! Liquids to which the bellows will be exposed:

.....
.....
.....
.....

! Working position:

❑ Horizontal ❑ Vertical

! Temperature of material falling on the bellows:

.....**°C**

! Part to be protected:

❑ Stem or shaft:
Diameter.....mm
❑ Screw:
Diameter.....mm
Pitch .....mm
❑ Ball screw:
Diameter.....mm
Pitch .....mm
RPM in rapid travel.....
❑ With longitudinal seam

❑ Other .....
.....
.....
.....

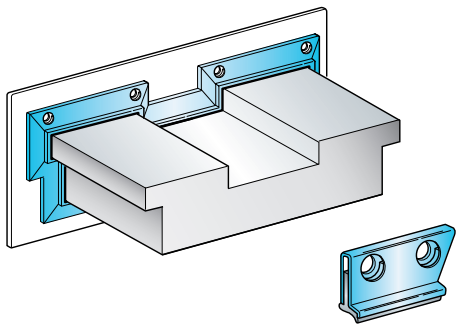
! Company name: .....
Contact person: .....
Tel.: .....**Fax:** .....
Quantity: .....
Annual demand: .....
Date: .....
Notes: .....

NOTE: The data fields and/or tables marked by ! are the least ones to be filled in order to give you a quotation.

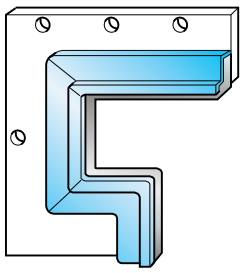
- **Resistant to oils, coolants and hot shavings**
- **Resistant to wear caused by friction produced during scraping**
- **Wiper profile flexible over time**

PROFILED WIPERS FOR GUIDES

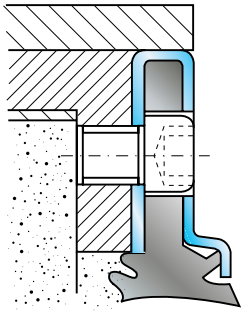
These consist of a **Stainless steel** housing to protect from shavings, and an inner profile of **Polyurethane**.



Example of guide mount



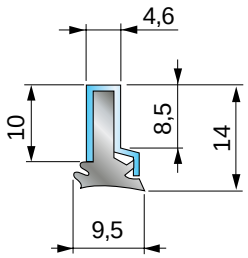
Example of flange mount



Possible method of fastening to guide

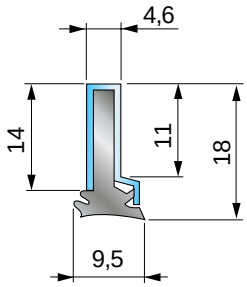
- For work environments with a heavy concentration of **sharp shavings**
- Built to **drawings** in any shape or size
- Solve the problem of **small quantities** since no expensive molds are used
- **Polyurethane** profile resists abrasion and is easily replaced
- We must have a drawing with measurements showing the **profile of the guides** on which they are to be mounted
- **Pre-loading** is determined by our engineering department based on the shape of the **wiper**
- For **fastening**, we recommend counter-sunk hex screws
- The wiper measurements refer to **free position** without pre-load
- **Prompt delivery** in standard linear strips

FB 14



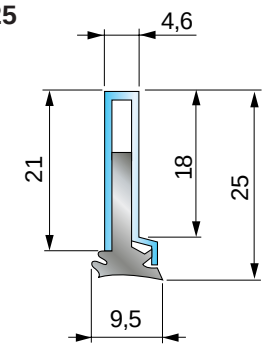
Profile: **Polyurethane**
Length: **530 mm**
Stainless steel reinforcement

FB 18



Profile: **Polyurethane**
Length: **3000 mm**
Stainless steel reinforcement

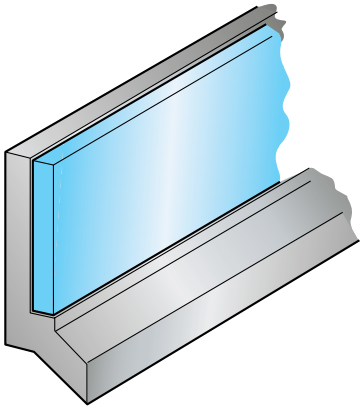
FB 25



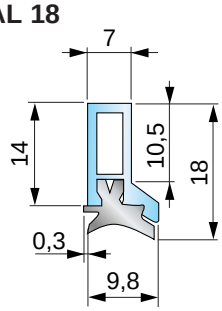
Profile: **Polyurethane**
Length: **3000 mm**
Stainless steel reinforcement

STANDARD LINEAR WIPERS

The range consists of three types of wipers. Codes **AL** and **FB** have metal reinforcements and polyurethane inner profile, while code **RA** consists of a metal insert to which a synthetic rubber profile has been vulcanized.

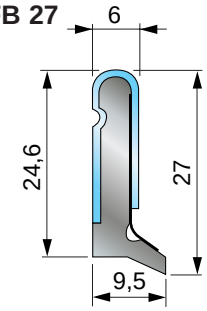


AL 18



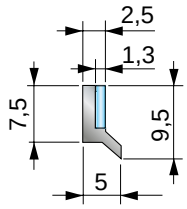
Profile: **Polyurethane**
Length: **1000 mm**
Aluminum reinforcement

FB 27



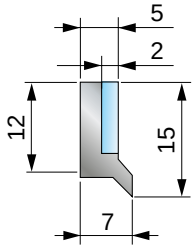
Profile: **Synthetic rubber**
Length: **500 mm**
Galvanized steel reinforcement

RA 01



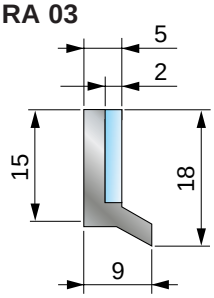
Profile: **Synthetic rubber**
Length: **500 mm**
Steel insert

RA 02



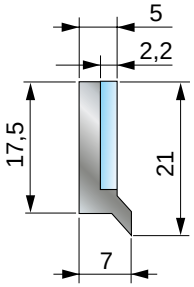
Profile: **Synthetic rubber**
Length: **560 mm**
Steel insert

RA 03



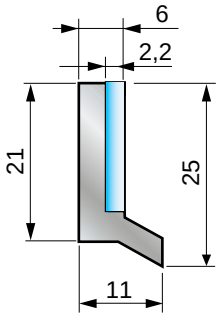
Profile: **Synthetic rubber**
Length: **560 mm**
Steel insert

RA 04



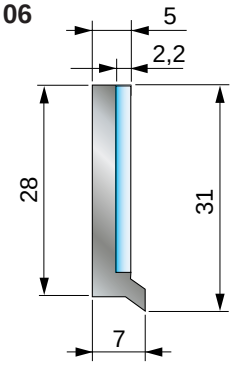
Profile: **Synthetic rubber**
Length: **560 mm**
Steel insert

RA 05



Profile: **Synthetic rubber**
Length: **560 mm**
Steel insert

RA 06

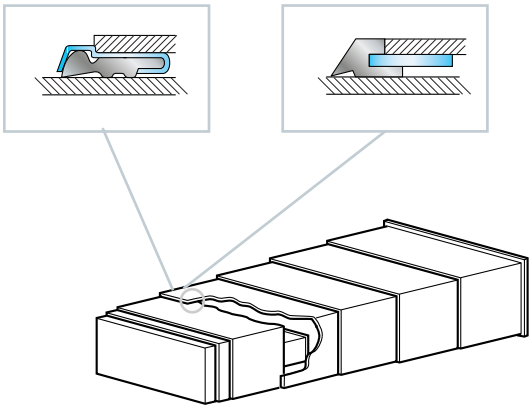


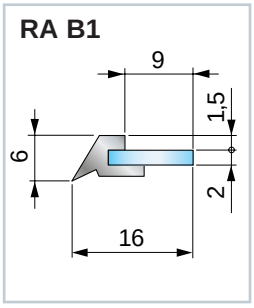
Profile: **Synthetic rubber**
Length: **560 mm**
Steel insert

- **Sold ONLY in standard strip-lengths**
- **Prompt delivery**

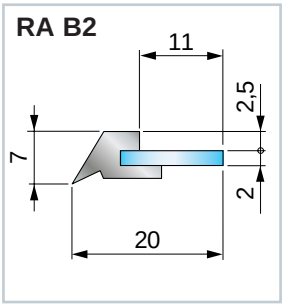
WIPERS FOR TELESCOPIC STEEL COVERS

These types of wipers are normally applied to telescopic steel covers.
Code **PR** has steel reinforcement and polyurethane profile, while code **RA** consists of a metal insert to which a synthetic rubber profile has been vulcanized.

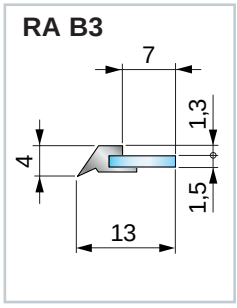




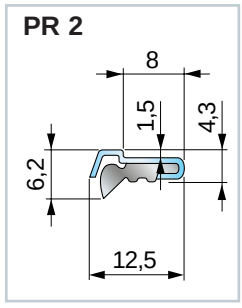
Profile: **Synthetic rubber**
Length: **560 mm**.
Steel insert



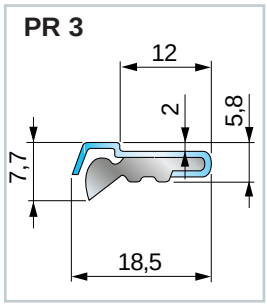
Profile: **Synthetic rubber**
Length: **560 mm**.
Steel insert



Profile: **Synthetic rubber**
Length: **560 mm**.
Steel insert



Profile: **Polyurethane**
Length: **3000 mm**.
Steel reinforcement



Profile: **Polyurethane**
Length: **3000 mm**.
Steel reinforcement

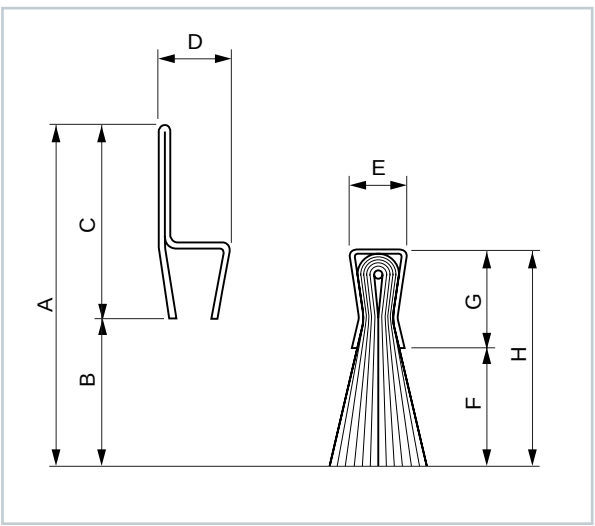
- **Sold ONLY in standard strip-lengths**
- **Prompt delivery**

- **Easy replacement of polyurethane profile for codes PR2 - PR3**
- **Polyurethane profile for codes PR2 - PR3 is delivered separate from steel reinforcement**

LINEAR BRUSHES WITH SUPPORT FRAME

- **Special shapes** may be created
- **The brush** is easy to replace
- The **support frame** is made of **galvanized steel**
- **Prompt delivery** in strips

Code	A	B	C	D	E	F	G	H	Length	Bristle
SN1	32	11	21	17	14	9	9	18	1000	Nylon Ø 0,15
SN2	42	22	20	9	6	26	5	31	2000	Nylon Ø 0,15
SN3	72	40	32	15	10	40	10	50	2000	Nylon Ø 0,25
SN4	92	60	32	15	10	60	10	70	2000	Nylon Ø 0,50
SN5	112	80	32	15	10	80	10	90	2000	Nylon Ø 0,50
SN6	132	100	32	15	10	100	10	110	2000	Nylon Ø 0,50
S01	40	20	20	9	6	24	5	29	2000	Brass Ø 0,15
S02	70	50	20	9	6	54	5	59	2000	Brass Ø 0,15
S03	100	80	20	9	6	84	5	89	2000	Brass Ø 0,15



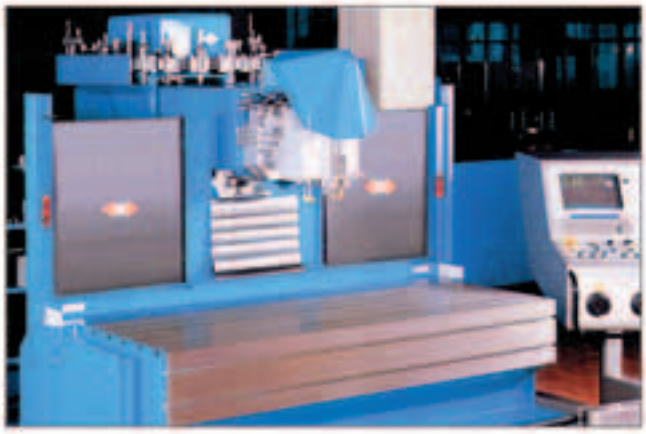
FABRIC MATERIAL LIST

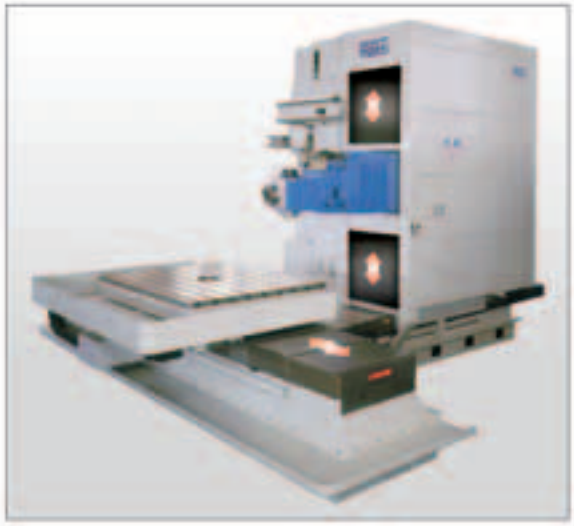
Code	Description of materials			Thickness	Heat resistance		Roll-up Covers			Thermic welded covers	Sewn round bellows		Heat-formed round bellows		
	Visible side	Fabric insert	Hidden side		Momentary contact °C	Continuous °C	Material suitable for cover without canister	Material suitable for cover with canister	Min winding diameter mm	Suitable material	Suitable material	Thickness of 1 fold (SP) mm	Suitable material	Thickness of 1 fold (SP) mm	With longitudinal seam thickness of 1 fold (SP) mm
TEMAT001	Neoprene*	Polyamide	Neoprene*	0,3	250	-15 +100	•	•	20		•	1	•	1,5	no
TEMAT002	Neoprene*	Polyester	Hypalon*	0,5	250	-20 +100	•	•	20		•	1,5	•	2,5	5
TEMAT202	Neoprene*	Polyester	Neoprene*	0,5	250	-20 +100	•	•	20		•	1,5	•	2,5	5
TEMAT003	Neoprene*	Polyester	Hypalon*	0,6	250	-20 +100	•	•	20		•	1,8	•	3	5,5
TEMAT004	Neoprene*	Polyester	Hypalon*	0,8	250	-20 +100	•	•	20		•	2,4	•	4	6,5
TEMAT005	Neoprene*	Polyester	Hypalon*	1,0	250	-20 +100	•	•	20		•	3			
TEMAT007	Neoprene*	Kevlar*	Hypalon*	1,15	350	-20 +100	•	•	20		•	3,5			
TEMAT008	NBR	Polyamide	NBR	0,4	250	-20 +100	•	•	20		•	1,2	•	2	4,5
TEMAT009	Silicon	Fiberglass	Neoprene*	0,42	350	-60 +200	•	•	20		•	1,5	•	5	10
TEMAT091	PVC	Fiberglass	PVC	0,44	300	-30 +80	•	•	20	•	•	1,5			
TEMAT101	Ptfe	Fiberglass	Ptfe	0,125	320	-200 +260	•	•	20						
TEMAT102	Ptfe	Fiberglass	Ptfe	0,250	320	-200 +260	•	•	20						
TEMAT104	Ptfe	Fiberglass	Ptfe	0,7	320	-200 +260	•	•	20						
TEMAT105	Ptfe	Kevlar*	Ptfe	0,42	320	-200 +260	•	•							
TEMAT106	Ptfe	Polyestere	Polyurethane	0,3	200	-30 +120	•	•	20	•					
TEMAT011	Aluminium-carbon fabric			0,7	2500	-100 +260	•	•	20	•	2,1				
TEMAT012	AISI 301 Stainless steel			0,2	1200	-250 +400		•	70						
TEMAT013	AISI 301 Stainless steel			0,3	1200	-250 +400		•	90						
TEMAT014	AISI 301 Stainless steel			0,4	1200	-250 +400		•	150						
TEMAT015	Polyurethane	Polyester	Polyurethane	0,25	200	-30 +90	•	•	20	•					
TEMAT151	Polyurethane	Polyester	Polyurethane	0,35	200	-30 +90	•	•	20	•					
TEMAT161	Polyurethane	Polyester	0,8	200	-30	+90	•	•	20		•	2,5			
TEMAT160	Polyurethane Grey	Polyester	1,4	200	-30	+90	•	•	70						
TEMAT162	Polyurethane	Polyester	1,4	200	-30	+90	•	•	70						
TEMAT164	Polyurethane	Kevlar*	Polyurethane	0,35	350	-30 +180	•	•	20	•	•	1,5			
TEMAT165	Polyurethane	Nomex*	Polyurethane	0,36	300	-30 +130	•	•	20	•					
TEMAT167	Polyurethane	Polyestere	Polyurethane	0,5	200	-30 +90	•	•	20		•	1,5			
TEMAT169	Polyurethane	Panox*/Kevlar*	Polyurethane	0,33	190	-30 +140	•	•	20	•					
TEMAT017	PVC	Polyester	PVC	0,36	100	-30 +70	•	•	20	•					
TEMAT018	PVC	Polyester	PVC	0,7	100	-30 +70	•	•	20		•	2,1	•	3,5	6
TEMAT019	PVC	Polyester	PVC	0,5	100	-30 +70	•	•	20		•	1,5	•	2,5	5
TEMAT020	PVC	Polyester	PVC	0,25	100	-30 +70	•	•	20	•					
TEMAT022	PVC	Polyester Net	Polyester Net	1,4	100	-30 +70	•	•	40						

* Neoprene, Hypalon, Kevlar, Panox and Nomex are registered Dupont trademarks.

FABRIC MATERIAL LIST

Code	Primary resistance characteristics
TEMAT001	Resists water, oil, coolant, diluted acids, petroleum products, atmospheric agents and ozone. Fair shear strength and abrasion resistance.
TEMAT002	Resists water, oil, coolant, diluted acids, petroleum products, atmospheric agents and ozone. Good shear strength and abrasion resistance. Hypalon is especially resistant to sea water.
TEMAT202	
TEMAT003	
TEMAT004	
TEMAT005	
TEMAT007	Same characteristics as above (from 001 to 005). Kevlar has excellent shear strength. Normally used when there is heavy mechanical stress, heavy concentration of sharp shavings, and high temperatures.
TEMAT008	Excellent resistance to mineral and vegetable oils, hydrocarbons, water and gas. Good mechanical properties. Normally used in the food industry since appropriate for use around oil, grease, blood, etc.
TEMAT009	Especially suited to high and low temperatures. Fiberglass has strong temperature resistance, but poor mechanical strength. Silicone is an excellent adhesive and resists chlorides, solvents, UV rays and ozone. **Self-extinguishing.**
TEMAT091	Fabric appropriate for use around small weld splatter. Also suitable for use around acids. **Self-extinguishing.**
TEMAT101	Work areas with heavy concentration of acids. Highly anti-adhesive surface. Low friction coefficient. Chemically inert. Resists formation of mold and fungus. Non-toxic. Highly limited thermal expansion. Transparent to microwaves and UV rays. Teflon is suitable for all acids except SODIUM-POTASSIUM-FLUORIDE at temperatures beginning at 150°C.
TEMAT102	
TEMAT104	
TEMAT105	Same characteristics as above. Excellent mechanical strength. Good shear strength of Kevlar. Normally used when there is heavy mechanical stress, heavy concentration of sharp shavings, and high temperatures.
TEMAT106	Excellent resistance to oils and chemical products. No adhesive surface. Low friction coefficient. Excellent chemical inertia. Excellent resistance to abrasion and bending resistance. **Mainly used in grinding machines.**
TEMAT011	Self-extinguishing by nature. Carbon fibers resist up to 2500 °C for short periods. Excellent mechanical strength. The aluminum-coating reflects radiant heat. Resists heavy weld splatter and molten metal; mainly used in foundries.
TEMAT012	Used for harsh working environments with heavy concentrations of sharp shavings and high temperatures. Excellent resistance to acids.
TEMAT013	
TEMAT014	
TEMAT015	Good resistance to petroleum products, oils and heavy abrasion. Excellent bending strength.
TEMAT151	
TEMAT161	Good resistance to petroleum products, oils and heavy abrasion. Good transverse rigidity. Normally used around medium quantities of shavings. Not suitable for dry use with hot shavings.
TEMAT160	Good resistance to petroleum products, oils and heavy abrasion. The two-ply fabric insert gives high transverse rigidity and attractive appearance. Normally used around large quantities of shavings. Not suitable for dry use with hot shavings. **Static-proof.**
TEMAT162	
TEMAT164	Good resistance to petroleum products, oils and heavy abrasion. Excellent bending strength. Excellent mechanical strength; Kevlar has excellent shear strength. Normally used when there is heavy concentration of sharp shavings, and high temperatures.
TEMAT165	Good resistance to petroleum products, oils and heavy abrasion. Excellent bending strength. Excellent mechanical strength. Good resistance to small weld splatter or hot material. Widely used in laser cutting machines. **Self-extinguishing.**
TEMAT167	Good resistance to petroleum products, oils and heavy abrasion. Excellent bending strength. Excellent mechanical strength.
TEMAT169	**Excellent resistance to mineral oils und grease; high abrasion resistance; excellent mechanical strength and bending strength. Good resistance to small weld splatter or hot material; at present considered the best commercial material to be used in laser cutting machines. Self-extinguishing.**
TEMAT017	Mainly used around heavy ambient dust, small splatter of coolant and oil. Also appropriate for use around acids.
TEMAT018	
TEMAT019	
TEMAT020	
TEMAT022	This material consists of high-strength polyester netting with a grid of 20 x 20 mm. Good mechanical strength; tensile strength of up to 60 kN/m.





Dimensions in mm.
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