

A photograph of a large industrial facility, likely a factory or warehouse, featuring several yellow robotic arms mounted on workstations. The entire area is enclosed by a silver-colored metal safety fence made of wire mesh. One of the fence doors is open, revealing the interior. The background shows a high ceiling with blue structural beams and large windows. A bright yellow diagonal graphic element is in the bottom right corner.

SAFETY FENCE

flexible aluminium system

Why aluminum safety fences?

Flexible aluminum-profile technology

Flexibility makes the difference. For this reason, we use a modular aluminum fence system that can be individually adapted to customer wishes and needs and that is open to future expansion.

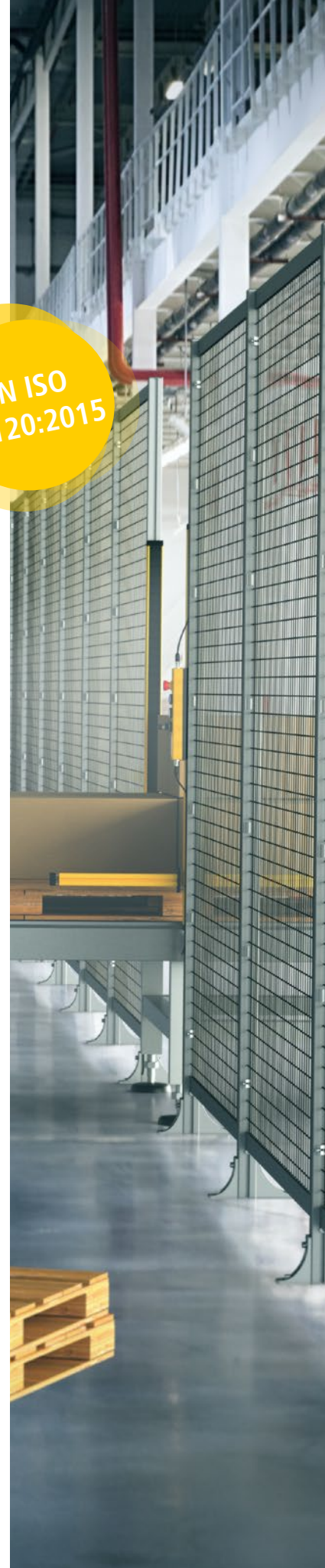
- **Flexible** - Fence guide, shapes and cutouts
- **Adjustable** - Easy assembly and sliding components
- **Uncomplicated** - No drilling thanks to the Fast Connect System
- **Cost-effective** - Functional systems and standard fields
- **Expandable** - Large selection of attachment parts



Design-oriented, robust and easily expandable aluminum fence for protective devices



MADE IN
GERMANY





FLEXIBLE

EXPANDABLE

ROBUST

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Safety Fence

Warehouse Logistics

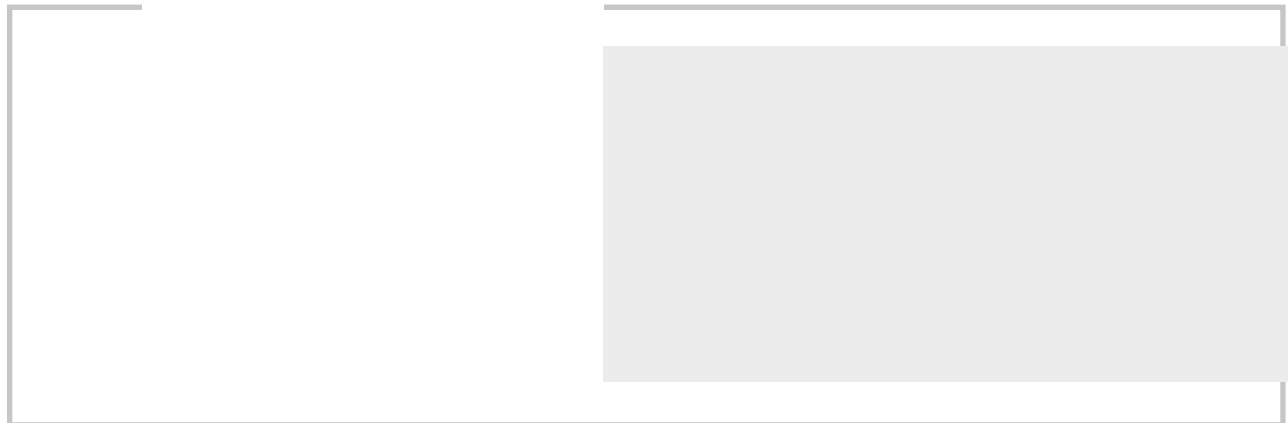


Uncomplicated and cost-effective solutions for large-scale storage and logistics facilities.

Harsh environments



Even under harsh environmental conditions, the SSP safety fence can be used individually.



Robot protection



Stable spot welding grid with reinforcing fixation technology and robust aluminum profiles. we are regularly tested using pendulum and ballistic tests.

Transparency



Thanks to polycarbonate fillings, the machines stay perfectly visible and provide not only grip guard and protection, but also good-looking machine safety.

Application Areas

Conveyor technology

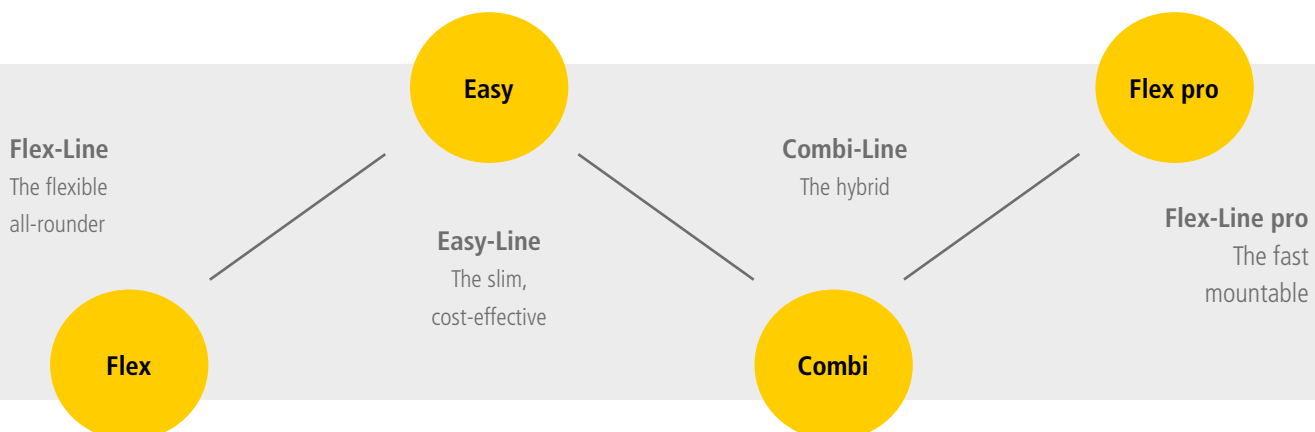


Requirements for construction heights and openings can be flexibly implemented.

Automotive



The SSP safety fence system reliably meets the requirements of automated production in the automotive industry.



Machine enclosure



The safety fence system is suitable for simple fence sections, for complex machine enclosures and for the enclosures of robotic installations, machines and manual workstations.

Individual



The route of the fence follows the route of the machine and the application. Angles, slopes, fillings and much more can be customized with the Flex-Line model.

Project Schedule

Our customers trust our service and expertise since many years.

Together with our colleagues from the technical support, we first analyze your plant and requirements regarding standards and workflows. Subsequently, our design team creates a 3D drawing of the safety fence. Based on this, you will receive your project-related offer incl. 3D model. A competent project manager is at your disposal during the implementation of the project.

In our manufacturing plant in Spaichingen the fence elements are manufactured and delivered as pre-assembled fence modules. "Made in Germany". The assembly is quick and easy thanks to the assembly instructions and the clearly marked safety fence modules. Of course, we also carry out the complete assembly on site for customers worldwide or provide support with assistance.



Risk assessment

Optional: Specification of safety and performance requirements.



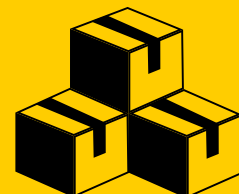
Safety concept

Preparation of a safety concept with information on height, ground clearance and safety components as well as distance dimensions at danger points.



Manufacturing

Manufacturing start at the German headquarters only after the project was approved by the customer.



Delivery

Fence elements are delivered pre-assembled and with assembly instructions.



Construction

Construction of the safety fence, adapted to project and customer requirements.



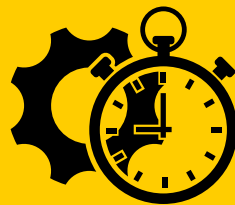
Offer

Offer including step files and drawings for detailed planning of the safety fence system.



Installation

The safety fence system can be installed by the customer or by SSP installation teams - even worldwide.



Overtravel measurement

Optional: Overtravel measurements to verify the correct safety clearance.

DID YOU KNOW...



... that you have to provide normative proofs for self-built guards?

A guard must fulfill several functions: separating the effective area of the system, absorbing impact effects from outside and inside.

» Obey the EN ISO 14120 standard if you build your own guard.

To prevent structural and machine parts from being thrown out of the enclosure, we carry out pendulum and ballistic tests.

This is relevant for the safety assessment in order to simulate the load on the protective device using impacts. For example, machine parts, tool parts or components can break during operation or become loose during rotary movements.

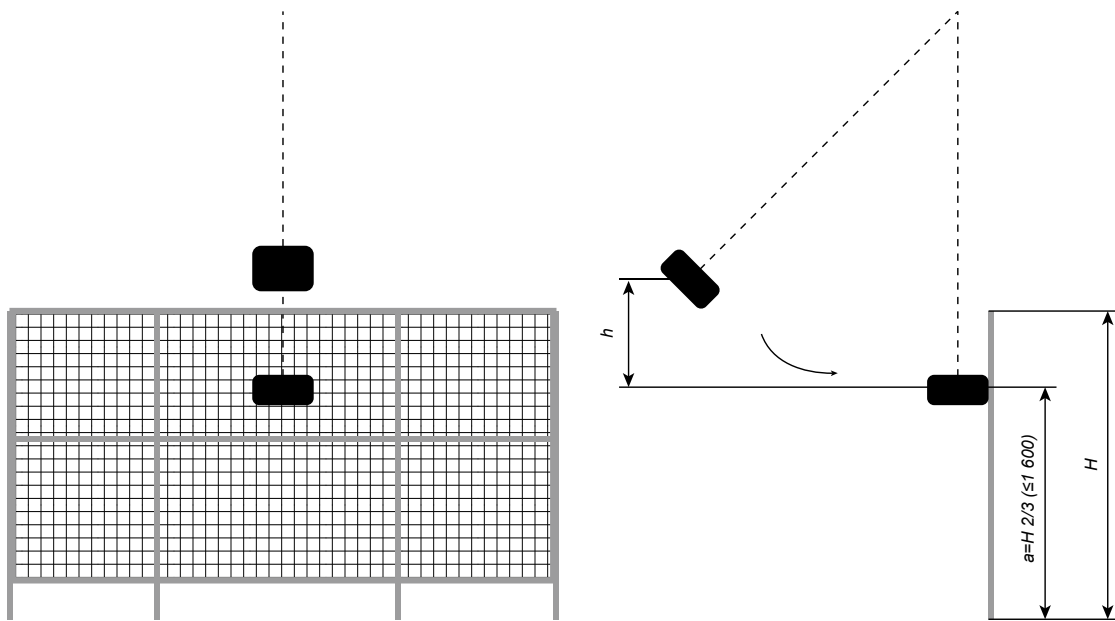
The **protected area** according to EN ISO10218-2 is defined with the **guard**. On the other hand, the robot has a safety-restricted space in which it can move. This is defined by design and the route of the fence adapts to this limited space.

The guard as a limiting device is an exception and must be considered precisely in the risk assessment.

If there is a risk of impact from a human, the guard must be able to restrain it.

This concerns the possibility of a person falling against the guard from the outside, as a result of tripping, for example. If this cannot be ruled out, it must be demonstrated for the guard using the pendulum test that the safety fence can withstand the impact.

Schematic presentation of a pendulum test



Legend

H Height of the guard

h Drop height

a Height of the impact point, which must not exceed 1600 mm

Enclosed is an excerpt from the experiments. The mass of the impact body remains unchanged at 90 kg. The complete test reports can be requested at SSP.

Fence line	Filling	Width	Height	Energy	Impact speed
Flex-Line pro	Polycarbonate 4 mm	1 m	2.2 m	460 J	3.2 m/s
Flex-Line pro	Polycarbonate 4 mm	1.5 m	2.2 m	115 J	1.6 m/s
Flex-Line pro	Polycarbonate 4 mm	2 m	2.2 m	706 J	4.0 m/s
Flex-Line pro	Spot welding grid 40 × 40 × 3.0 mm	1 m	2.2 m	115 J	1.6 m/s
Flex-Line	Spot welding grid 40 × 40 × 3.0 mm	1.5 m	2 m	460 J	3.2 m/s
Flex-Line	Polycarbonate 5 mm	1.5 m	2 m	460 J	3.2 m/s
Flex-Line	Aluminum composite panel 4 mm	1 m	2 m	460 J	3.2 m/s
Flex-Line	Single-pane safety glass 5 mm	1 m	2 m	115 J	1.6 m/s
Flex-Line	Polycarbonate 3 mm, welding protection	1.25 m	2.2 m	230 J	2.3 m/s
Flex-Line	Steel plate 1 mm, cambered	1.25 m	2.2 m	460 J	3.2 m/s
Easy-Line	Spot welding grid 40 × 40 × 3.0 mm	1.5 m	2 m	115 J	1.6 m/s
SE field	Spot welding grid 40 × 40 × 3.0 mm	1 m	2 m	115 J	1.6 m/s

Product Safety



Pendulum test

All safety fences meet the minimum requirements according to DIN EN ISO 14120:2015 Annex C. A pendulum test with a minimum energy of 115 J. This corresponds to a soft impact body with a mass of 90 kg at a speed of 1.6 m/s. This demonstrates the resistance of the protective device to human body impacts from outside the protected area.





The aluminum safety fence meets the requirements of the Machinery Directive 2006/42/EC, as well as the standards DIN EN ISO 12100 and DIN EN ISO 10218-2 when correctly designed. Continuous optimization and testing of the safety fence system using pendulum and ballistic tests.

The Safety Fence System

Flexible shape

The route of the fence is determined by the shape of the machine. Each system can be combined with each other.

Equipment

Extensive equipment such as cable ducts or mounting plates complete the product range.

Doors

Wing and sliding doors with functional attachment parts create safe access options.

Special designs

Almost all special shapes are possible.

Access options

Seamlessly integrable lifting and high speed gates are designed for the highest industrial demands

Colors

Powder-coated profiles in RAL colors or colored fillings and profile strips provide individual accents.

Safety sensor technology

Large portfolio of safety switches with or without guard locking, light curtains, etc.



Heights and breakthroughs

Height differences and cutouts can be implemented at any point.

Design

Filling types and shapes can be freely combined.

High speed gates

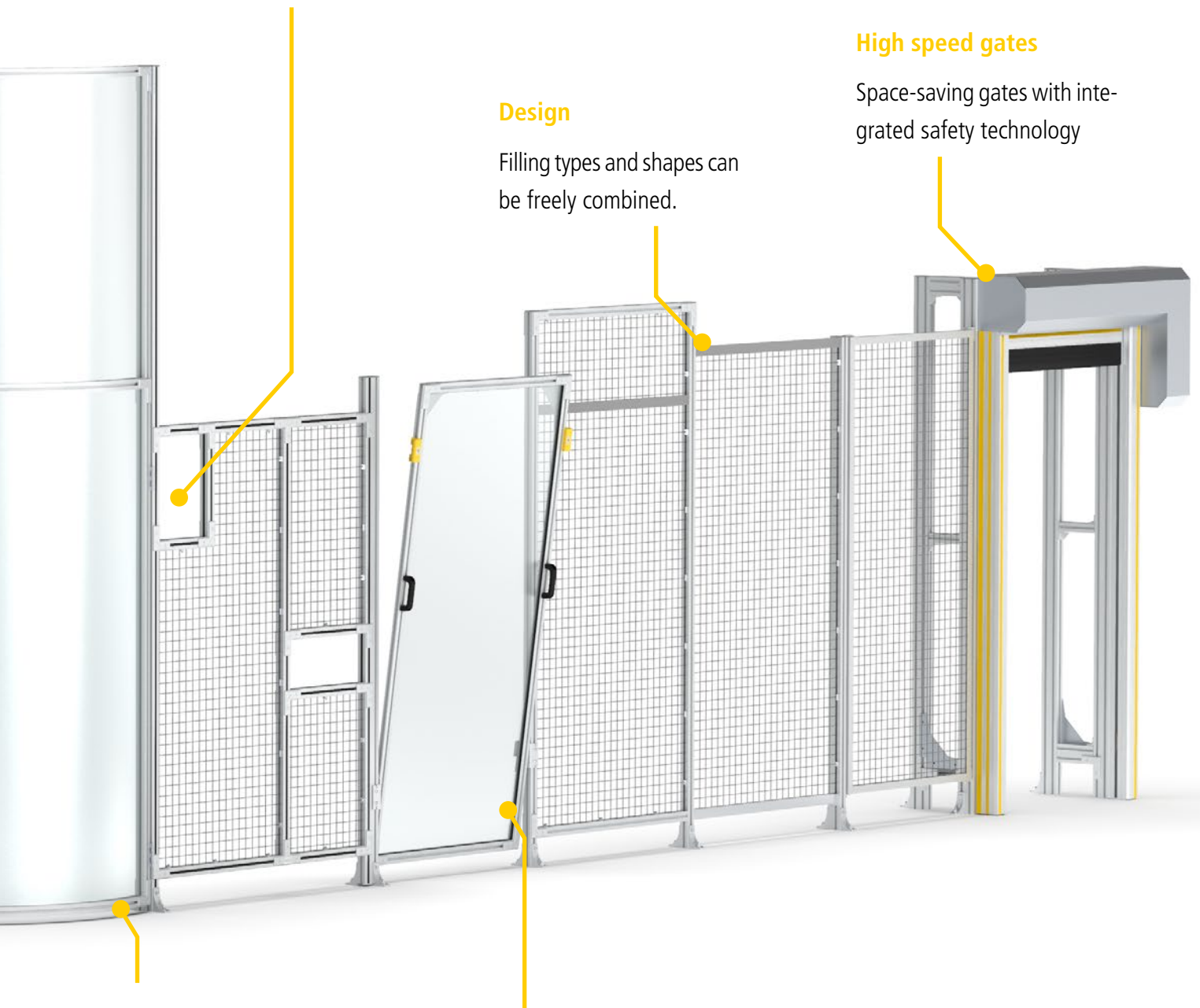
Space-saving gates with integrated safety technology

Curved fields

Curved safety fence elements are also no problem.

Maintenance access

The quick-release panels are specially designed for maintenance access.





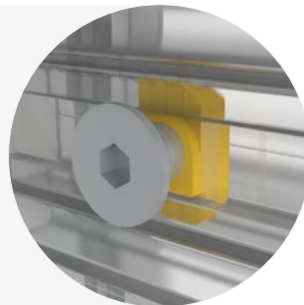
The Safety Fence System

Aluminum profile

Anodized 44 x 44 mm profiles with an 11 mm groove form the basis of the safety fence system. Other matching profile sizes can be easily combined with each other. Due to the special design, the profiles are light but still stable.

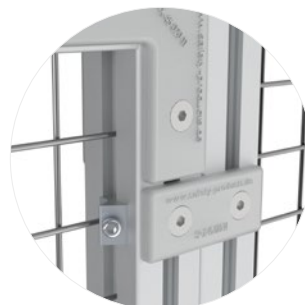
Slot nuts

The basis of the Fast Connect technology are the slot nuts. They position themselves in the groove when screwed in and allow fast assembly.



Fitting technology

The combination of fittings and slot nuts enables uncomplicated connection of the individual aluminum profiles. Drilling and thread cutting is not necessary. L, T and I fittings ensure stable and flexible mounting of aluminum profiles.



Fillings

Wide range of fillings made of different materials for safety and functionality. From spot welding grid to transparent polycarbonate and opaque sheet metal to special fillings such as fine real glass.





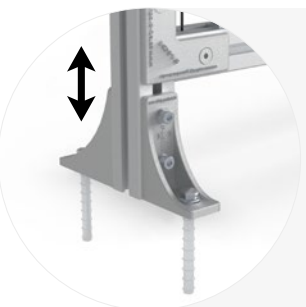
Grid fixation

The grid fixation ensures a solid connection between the profile and the filler. It increases the total stability of the safety fence.



Clamping strips

Polycarbonate, sheet metal or real glass fillings are additionally fixed with clamping strips. This stabilizes the connection and reduces vibrations.

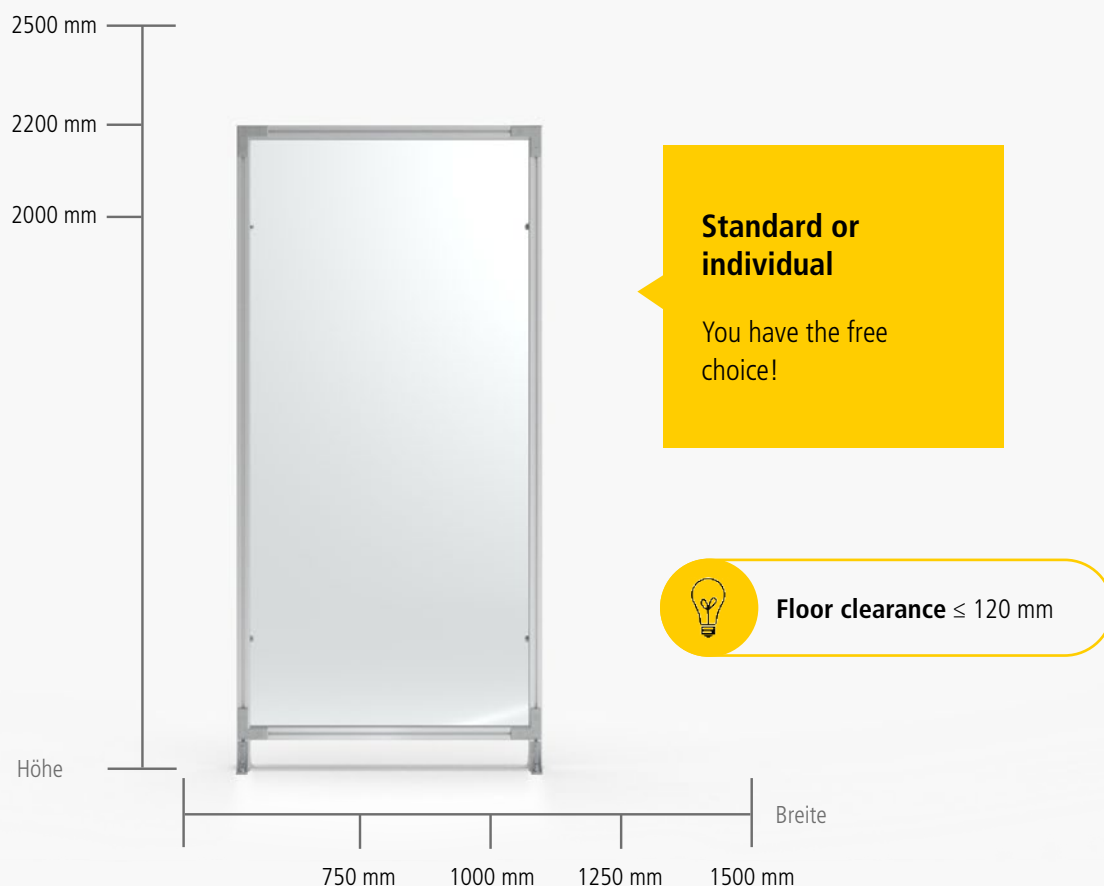


Floor attachment

The combination of floor attachment bracket and aluminum profile compensates for any unevenness. The floor angles can be mounted at different heights. Expansion anchors provide a firm hold in the floor.

Standard or Individual Dimensions

With the safety fence system, any size of protective device is possible. For cost-effective and efficient solutions, there is established standard dimensions for safety fence panels.



You do **not need a construction**, but are looking for **pre-fabricated single panels**?
On our homepage you will find a wide range of **safety fence panels with short delivery times**.



From the drawing to a finished fence



After the design and manufacturing, the safety fence is installed on site.

Thanks to the sophisticated system, the installation of the safety fence is easy and efficient. The pre-assembled safety fence elements are color-coded and come with assembly instructions and documentation. The assembly is explained in detail via an online video.

For larger or complex projects, the experienced installation team is available worldwide.

A large industrial safety gate, the Flex-Line model, is shown in a factory setting. The gate is made of aluminum and glass, with a white control box on the left side. It is partially open, revealing a wooden pallet on a conveyor belt. The background shows a complex industrial structure with steel beams and hanging lights.

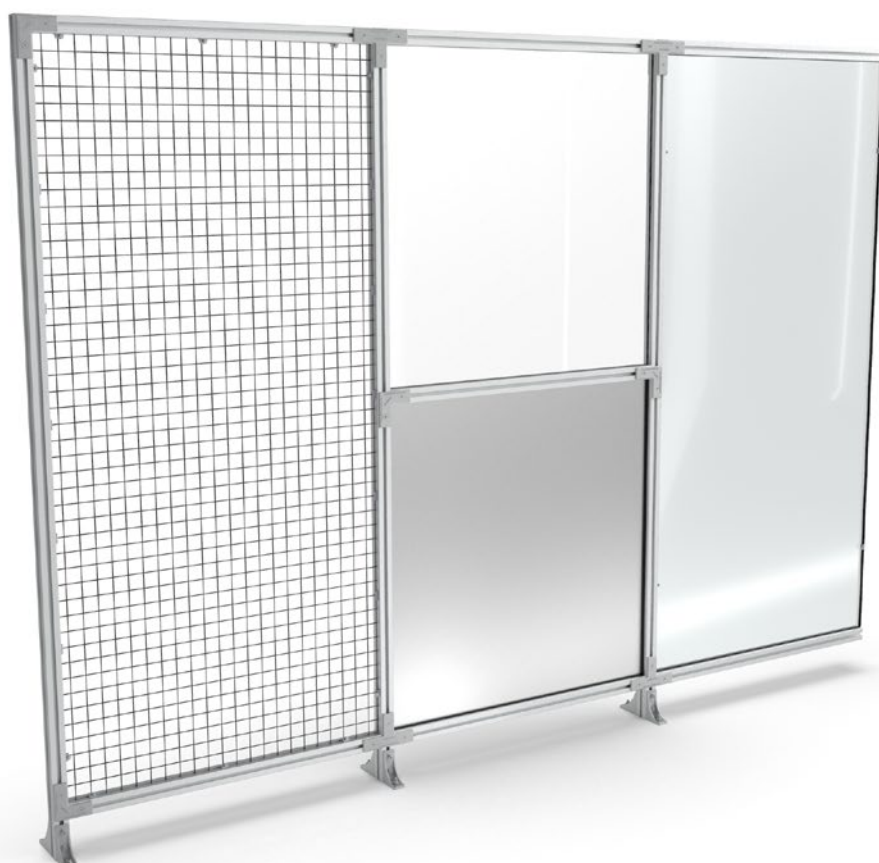
Flex-Line

the flexible all-rounder





Flex-Line



Stable profile on top



Stable profile at the bottom



Flex-Line is the most flexible and individual system of the safety fence series. In addition to a variety of fillings, almost any route of the fence or safety fence shape is possible.

Filler types can be freely combined. Breakthroughs, tunnels, slopes or openings are possible at any point of the fence. This makes the system ideal for complex solutions. In addition, Flex-Line is very robust and stable and can be combined with all other SSP safety fence systems.



Fillings

- Spot welding grid
- Polycarbonate
- Sheet metal
- Safety glass
- Special fillings

Features

Cross profile with Fast-Connect fittings at the top and bottom. Many attachment options as well as fillings that can be freely combined.

Highlight

Incomparable individuality and flexibility



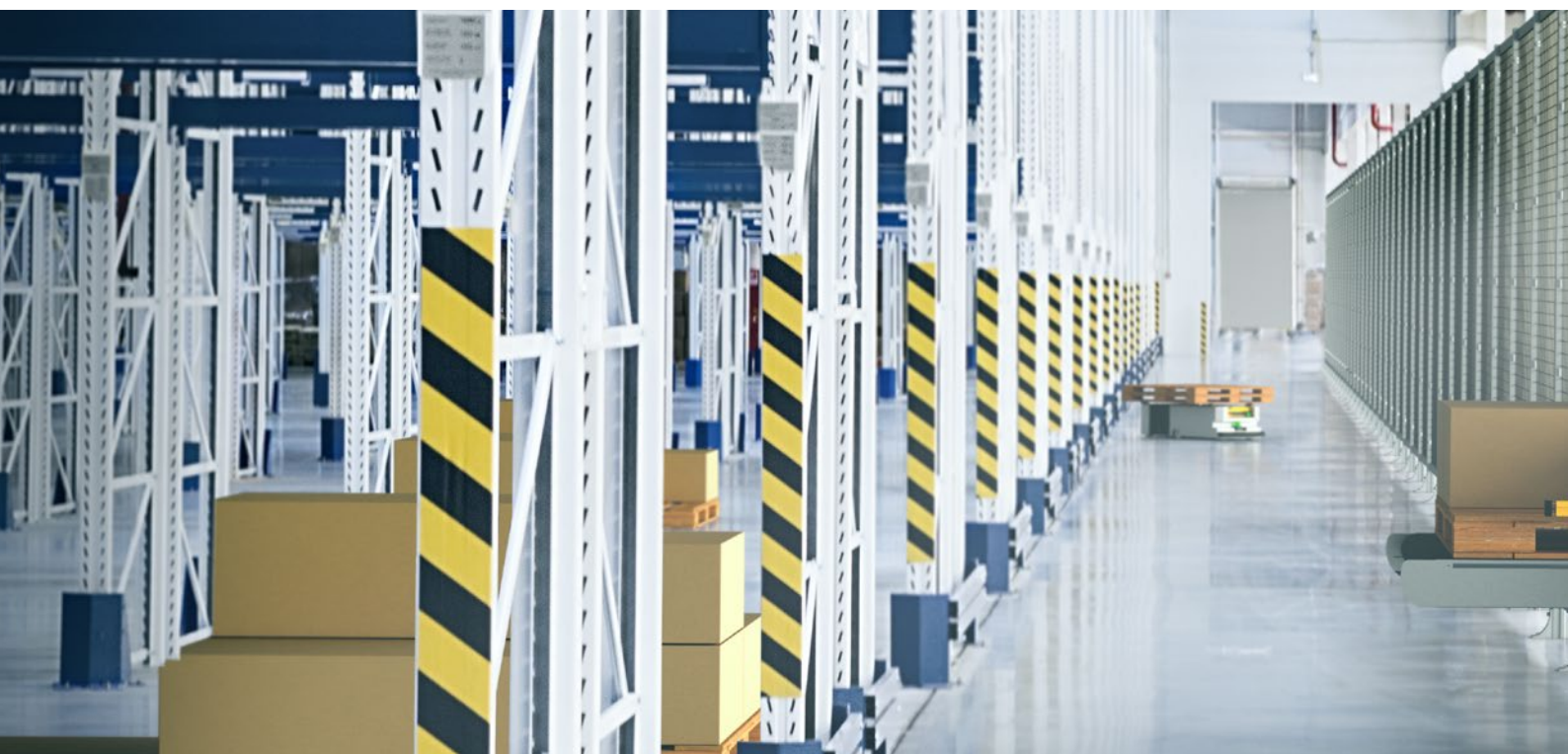
Standard floor clearance 107 mm



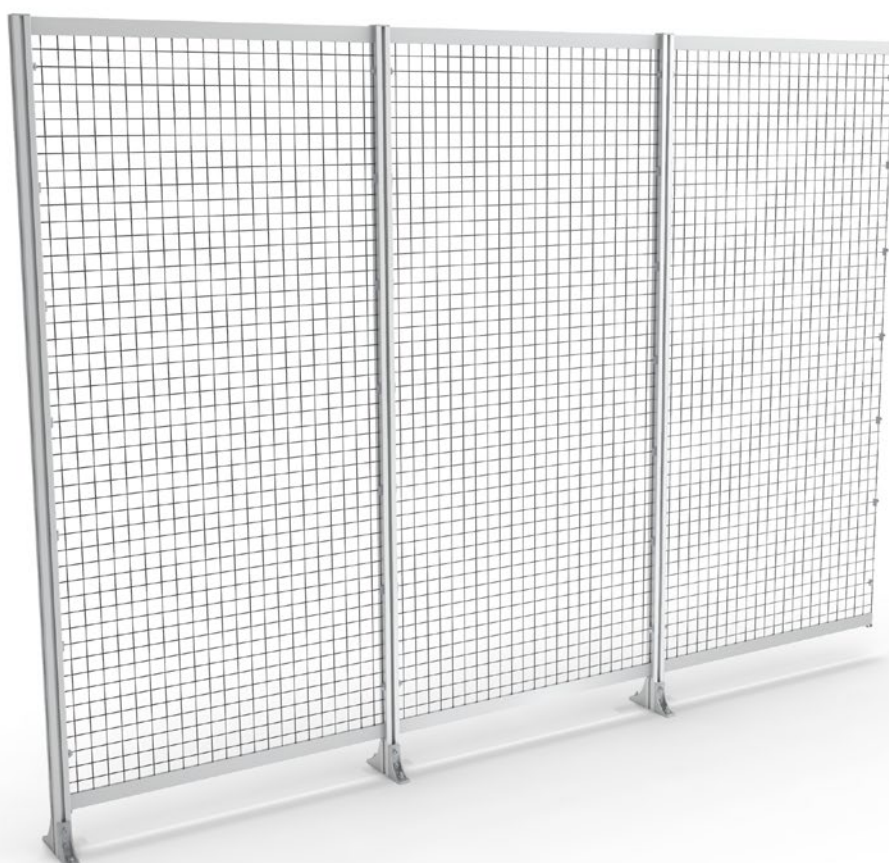
Easy-Line

the slim, cost-effective variant





Easy-Line



H-rail on top



H-rail at the bottom



Easy-Line is the most cost-effective and economical solution of the safety fence system thanks to the reduced use of materials.

It can be combined throughout with other safety fence models and is mainly used for long and simple fence lines and enclosures.



Fillings

Spot welding grid

Features

Torsionally rigid H-rails as upper and lower finish. No Fast-Connect fittings.

Highlight

Cost-effective model, ideal for large and simple routes



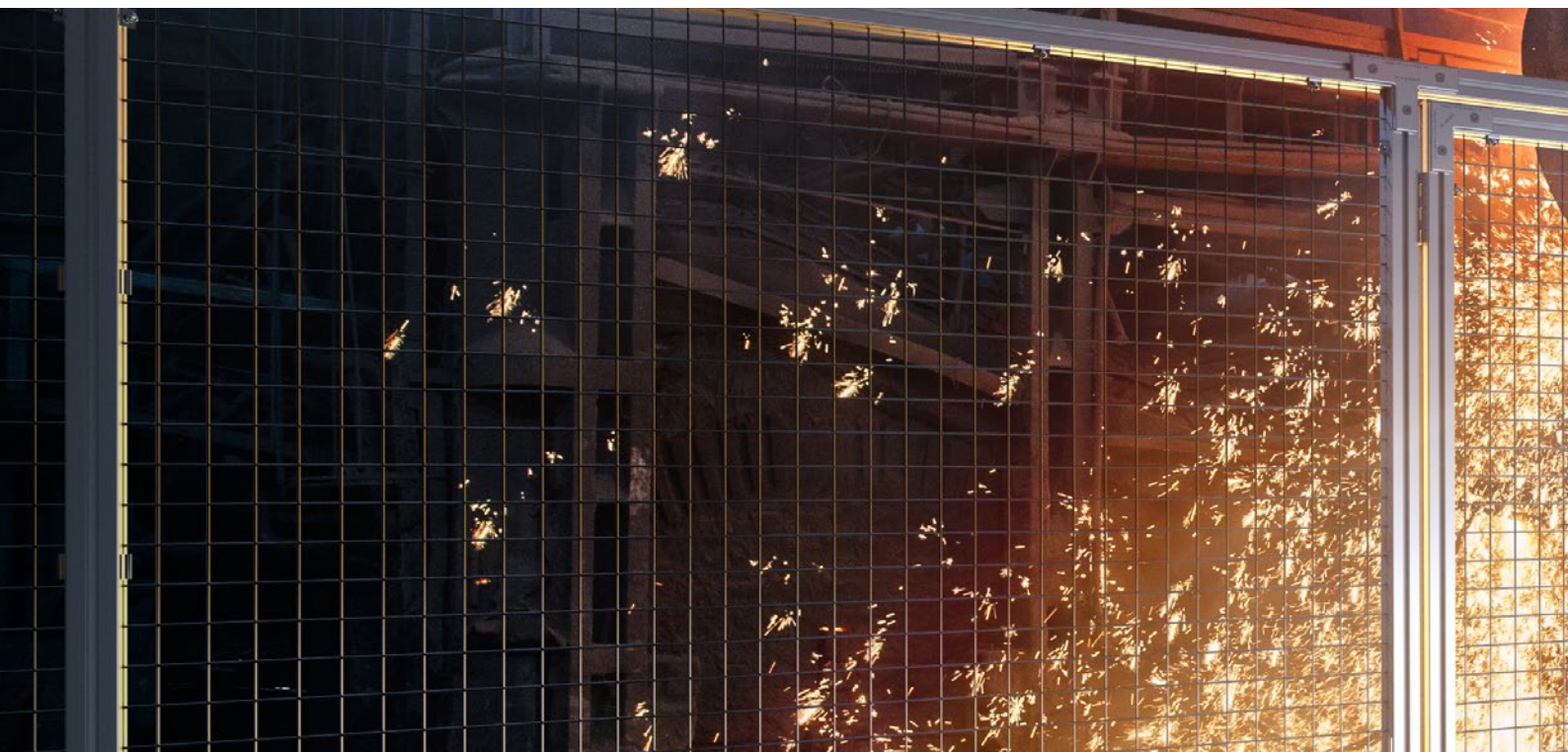
Standard floor clearance 120 mm



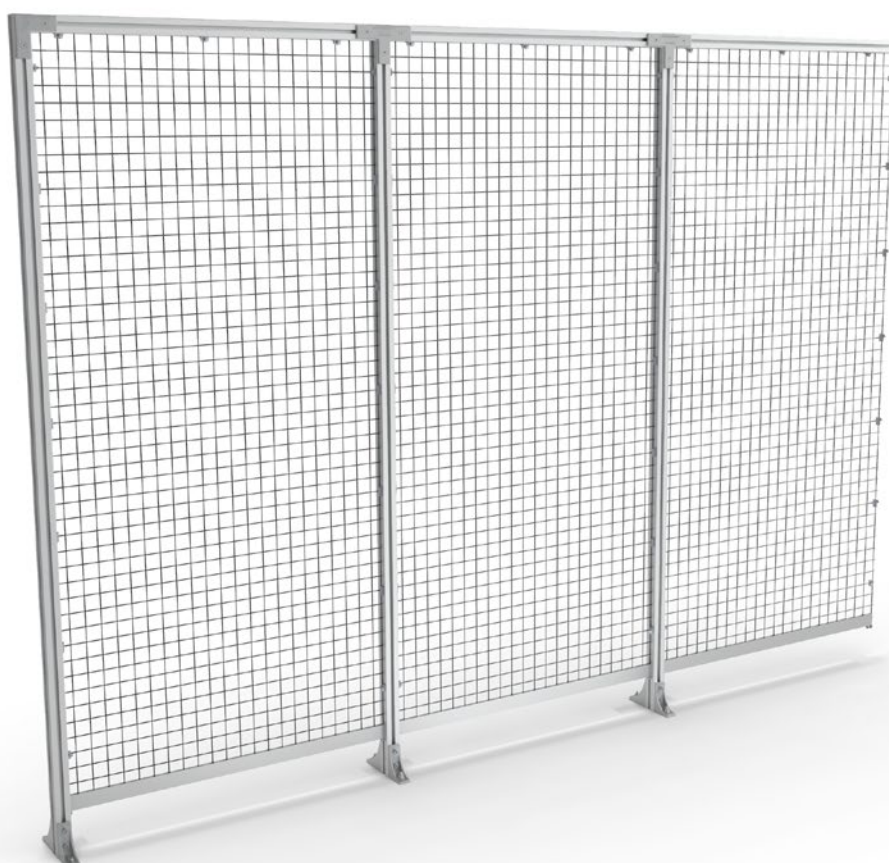
Combi-Line

the hybrid





Combi-Line



Stable profile on top

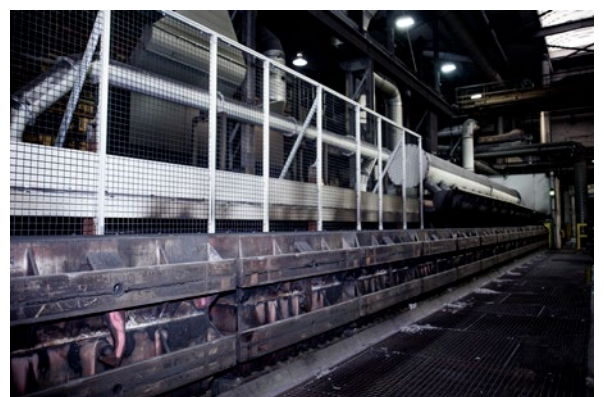


H-rail at the bottom



Combi-Line combines economy with stability. The cross-profile with Fast-Connect fitting in the upper area provides strength and attachment options. The lower end is a stable H-rail.

The system is used mainly for longer fence runs of average complexity.



Fillings

Spot welding grid

Features

Aluminum profile with Fast Connect fittings at the top and torsion-resistant H-rails at the bottom

Highlight

cost-effective safety fence model, flexible thanks to attachment variants



Standard floor clearance 117 mm

A photograph of a modern industrial factory floor. In the foreground, a series of grey metal safety fences with black wire mesh panels are arranged in a line. Behind the fences, several red and black robotic arms are visible, mounted on a system. The background shows a large, open industrial space with high ceilings, white structural columns, and multiple levels of blue and yellow storage racks filled with various components. The floor is a smooth, light grey concrete.

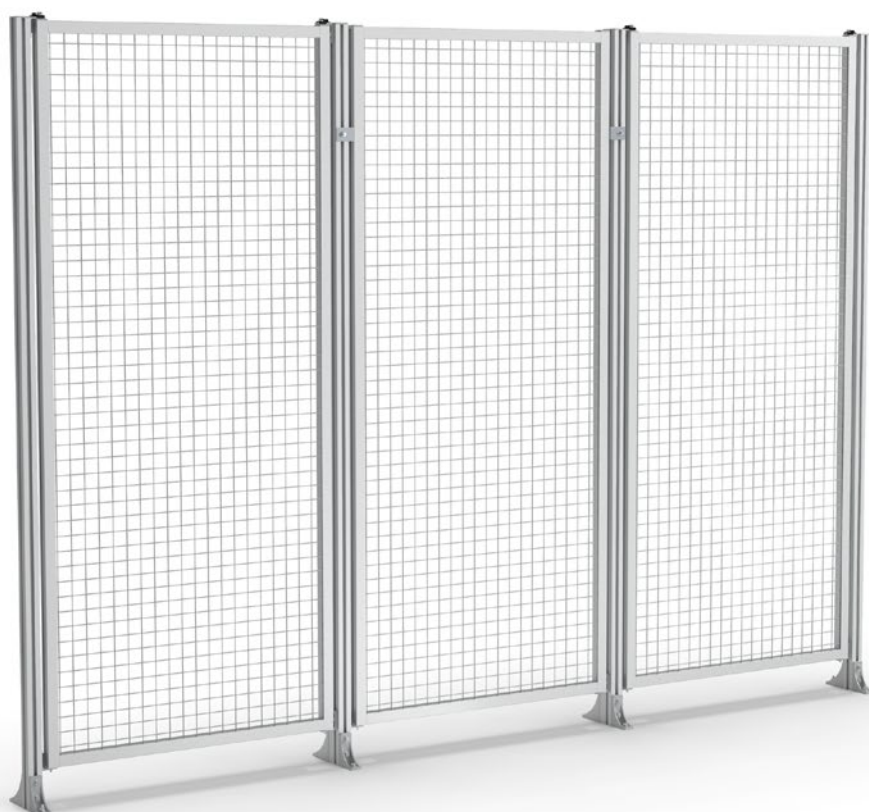
Flex-Line pro

the quick to assemble variant





Flex-Line pro



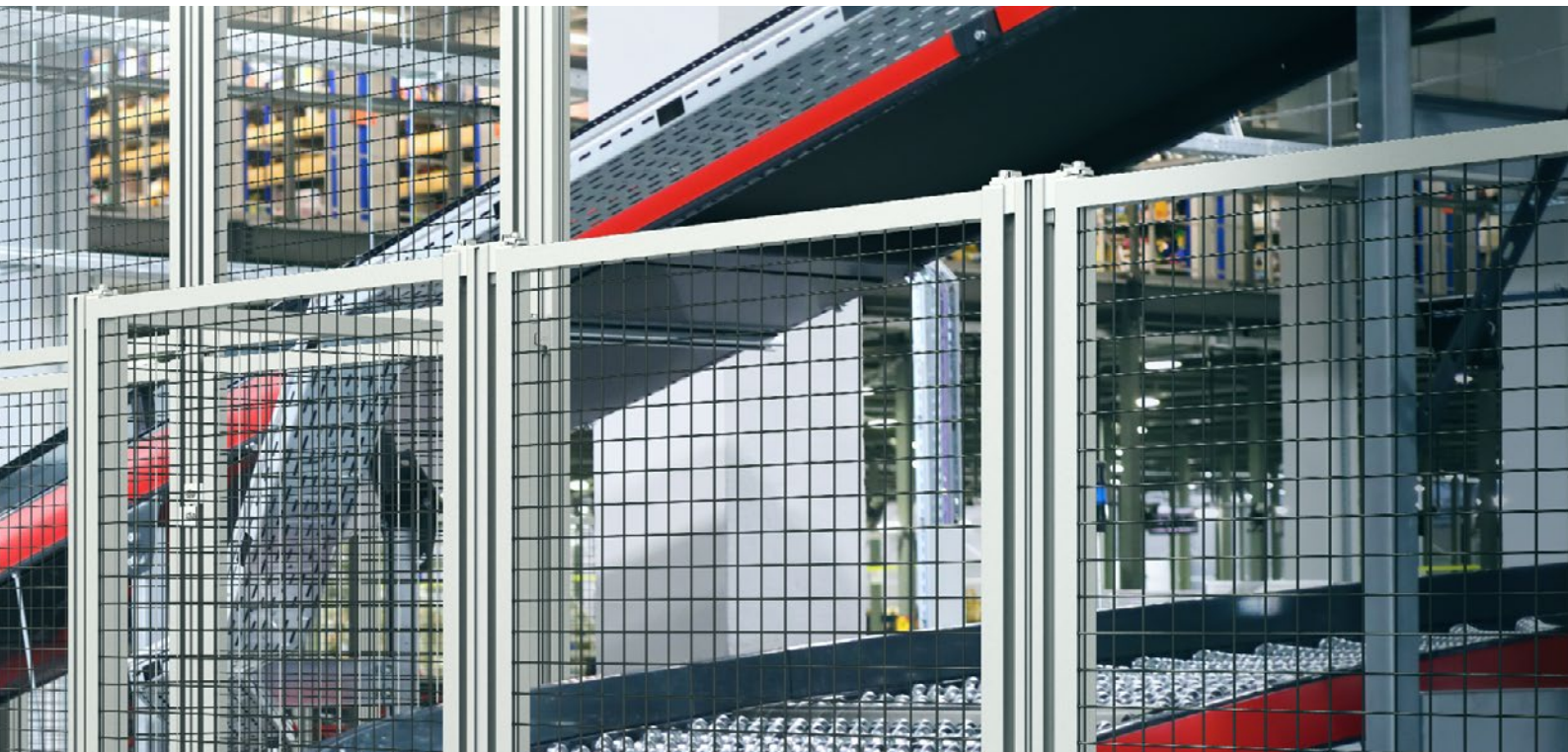
Quick mount on top
or



Quick mount at the front



Profile guide at the bottom



Flex-Line pro is the safety fence variant that is the easiest and fastest to set up. Pre-assembled safety fence panels that only need to be hooked and locked between the two posts make the installation very efficient. As a result, the safety fence panels can also be dismantled if necessary and are equipped with captive parts.

Flex-Line Pro can be combined with all of our other safety fence systems and allows all filling variants.



Fillings

- Spot welding grid
- Polycarbonate
- Sheet metal
- Safety glass
- Special fillings

Features

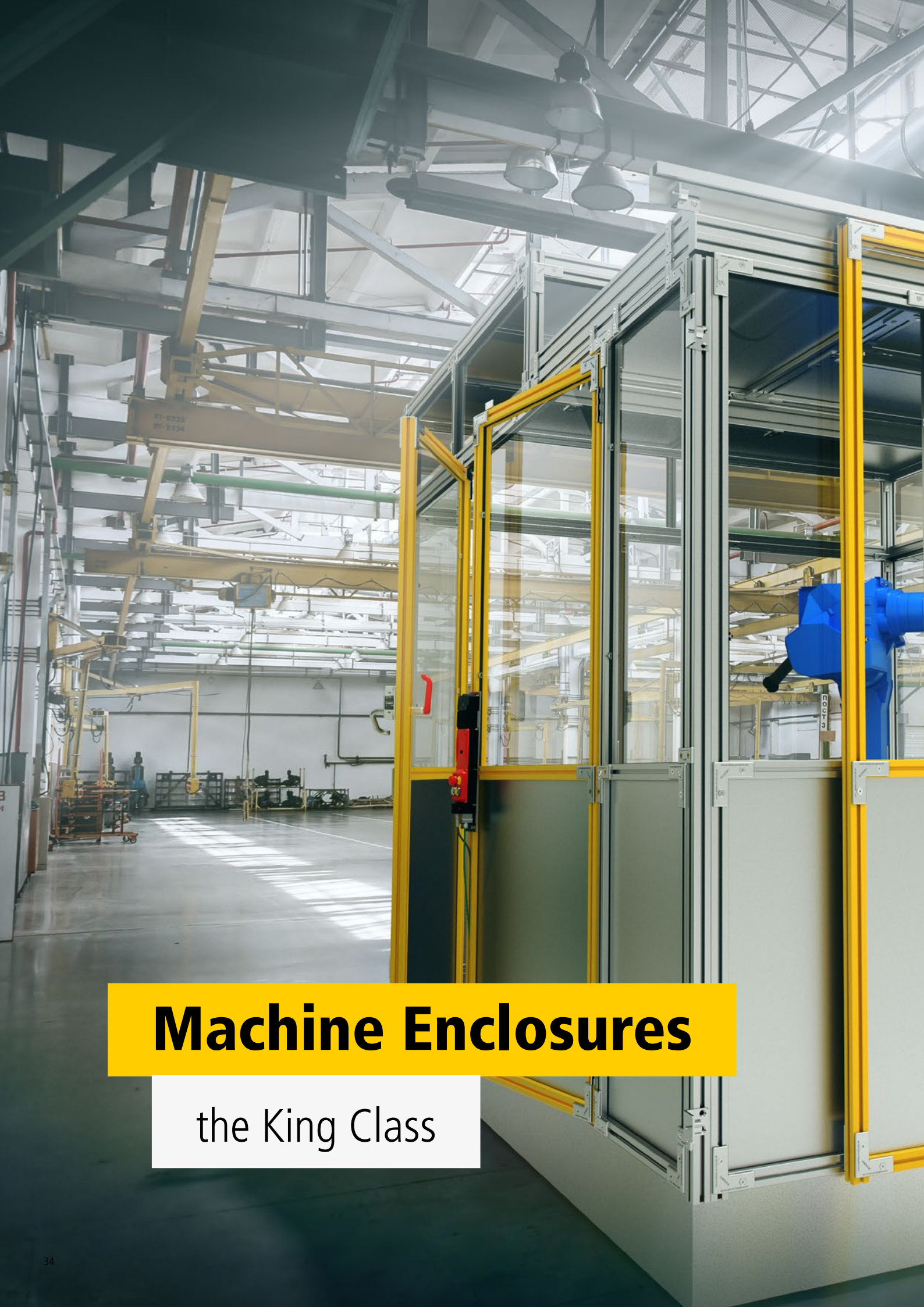
Posts made of aluminum profiles. Pre-assembled fence panels are simply hooked into place. Captive parts.

Hightlight

Quick assembly due to pre-assembled fields



Standard floor clearance 114 mm



Machine Enclosures

the King Class





Machine Enclosures

The safety fence system is suitable not only for safety fences, but also for complex enclosures such as those for robotic systems, processing centers and workstations.

Together with SSP, its designers and project managers, individual special solutions can be created at any time.

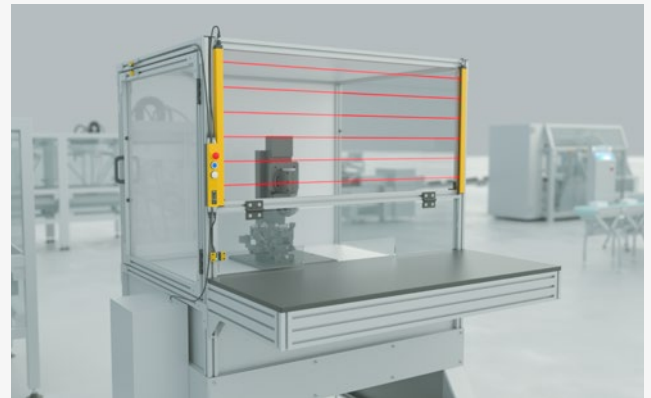
Advantages

- ✓ Various heights
- ✓ Variety of fillings
- ✓ Lockable with roof
- ✓ Can be combined with doors and gates
- ✓ Special cutouts, hatches and openings



Machine enclosure

An enclosure with special dimensions as well as roof and viewing windows. The sliding gate allows quick access for loading and unloading.



Manual workstation

The manual workstation is secured with various openings and flaps. The flexible aluminum profile system easily realizes customer-specific requirements. We also supply the appropriate safety sensors, light beams and safety controllers for a complete system.



Laser cabin

The Flex-Line system allows various safety fence fillings that can be freely combined. Thus, a laser cabin can be equipped with lightning protection and stable plates.



Robot enclosure

A robot enclosure with integrated high-speed gate at working height for loading and unloading.

DID YOU KNOW...



... that an access at a guard does not necessarily need a safety switch for the electrical interlocking?

Safety doors in enclosures that are rarely used are complex and expensive. Omit the door and simply unscrew the fence **is not allowed!** we offer a solution for this: **the quick-release panels.**

What criteria must a quick-release panels meet?

- ✓ Under the Machinery Directive 2006/42 EC, it is already defined that the fasteners can only be opened or removed with tools. This is to ensure that only qualified or authorized persons open the guards
- ✓ Fasteners must remain on the fixed guards. Normal screws are therefore not permitted. This is to exclude the possibility of losing the fasteners.
- ✓ The guards must not remain in the protective position after the fasteners have been released. This is to ensure that a mandatory guard is properly installed and that is immediately visible at the position.
- ✓ Guards, that cannot be easily moved or transported by hand, must be equipped with or have an attachment for suitable fastening devices for transport with a lifting device.

Further information can be found in DIN EN ISO 12100-2011-03 and DIN EN ISO 14120, both dealing with guards as the topic.

Another issue is the frequency of access. According to DIN EN ISO 14120, a fixed guard is only permitted if the suspected frequency of access is low. (e.g., **less than once per week**) with easy re-attachment and provided that removal and re-attachment can be done in a safe work system.





Quick-Release Panel



**Ideal as
maintenance
access**



The quick-release panel is a real improvement during maintenance work. Using the supplied special key, one person alone is able to open and remove the quick-release panel, if necessary.

It is important to make sure that the panel remains in a predefined position after opening and that it is obvious to everyone that the panel is no longer closed. The fastening elements are firmly attached to the panel and remain captive on the panel even after removal.

- ✓ No electrical fuse protection is necessary
- ✓ All parts are captive.
- ✓ Key coded according to EN ISO 14119
- ✓ Tilts to the predefined position after unlocking by gravity
- ✓ Individual dimensions
- ✓ All filling variants for maximum flexibility
- ✓ Fast and uncomplicated assembly through simple hooking in



Attachment of the quick-release panel



Locking with key

DID YOU KNOW...



... why we use black grids by default?

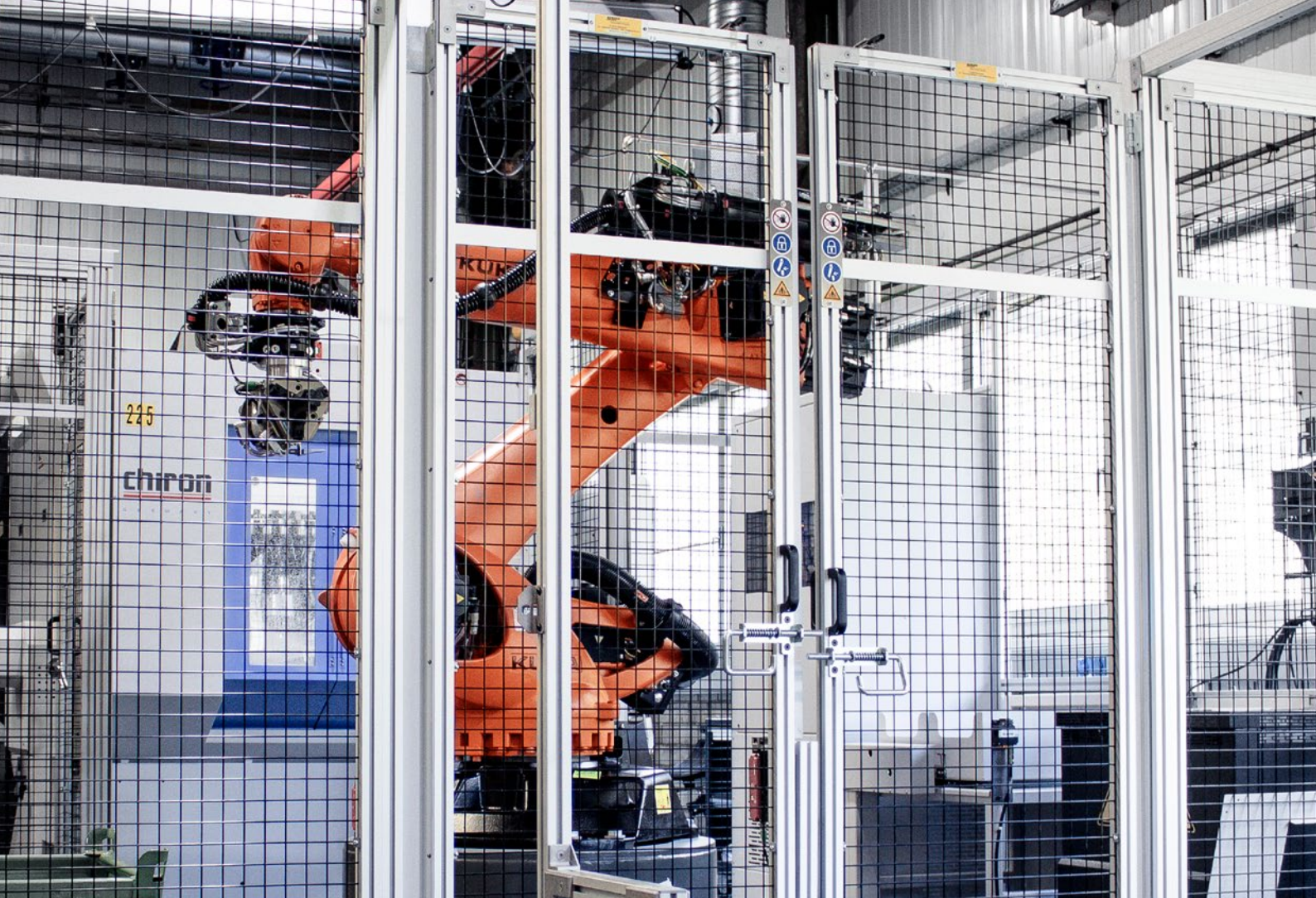
The entire RAL color palette is possible for the elements of the SSP safety fence system. However, there is something to consider.

» The relevant standard DIN EN ISO 14120 requires the following:

If observation of machine operation is required, e.g. for troubleshooting or during setup operation by the guards, materials with suitable properties must be selected. For example, required safe glass or polycarbonate. If a perforated material such as a perforated plate or spot welding grid is used, they should have properly sized openings and be dark in color to provide sufficiently good view.

The safety fence fillings made of perforated material should not be painted in bright colors for process observation, as they may obstruct the view of the working process. Visibility is improved when the **perforated material is darker** than the area to be observed. Therefore, our spot welding mesh is black-powder coated. At the same time, this has the advantage that it is particularly robust and resistant to the influences of everyday operations. We recommend highlighting the dangerous movements in color, but keeping the guard neutral!





Wing and Sliding Doors

The wing and sliding doors are as flexible and versatile as the safety fence system itself.

Wing and sliding doors, lifting and rolling gates: Each variant can be combined with all models of the fences. Matching locks, safety switches or access monitors are available for each safety fence system and application. They can be ordered directly from us, together with the corresponding mounting plates and equipment.



- ✓ Special sizes and designs are available individually
- ✓ All fillings can be used in the same way as the safety fence system
- ✓ **Wing doors**, robust and durable hinges increase the service life
- ✓ **Double wing doors** without lintel facilitate access to the machine with overhead cranes
- ✓ **Sliding doors**, well-guided guide rails and robust materials ensure durability
- ✓ Safety sensors and safety guard locks up to PLe in accordance with EN ISO 13849-1 can be supplied pre-assembled



Protection for every application

Our safety switch portfolio offers customized and modular models. Whether robust, with modern wireless communication or purely mechanical. We offer the suitable solution for every kind of access.

Application Examples



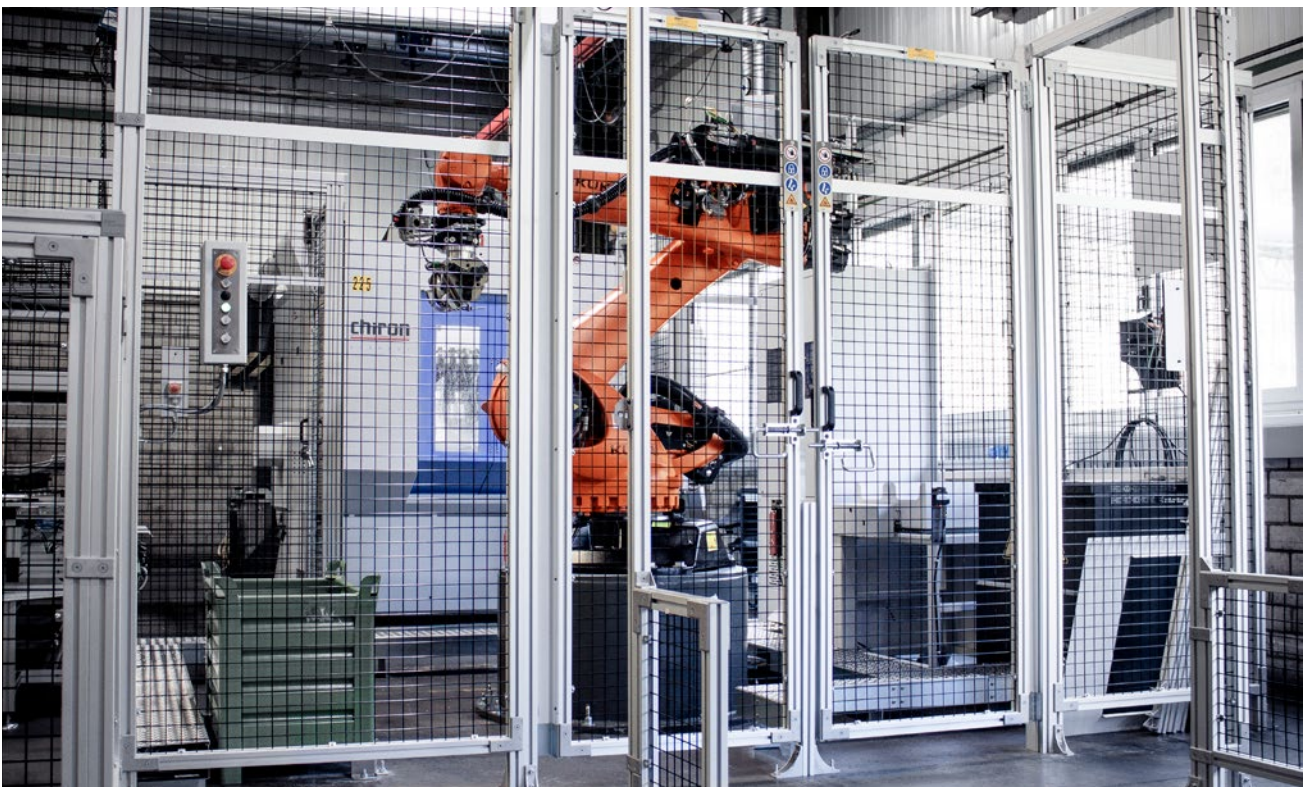
Floor sliding gate



Sliding gate with yellow powdered aluminum profile



Double sliding gate



Double wing door

Manual Lifting Gates



Top opening
opening from top to bottom



Centeropening
opening from bottom to top



Bottom opening
opening from bottom to top

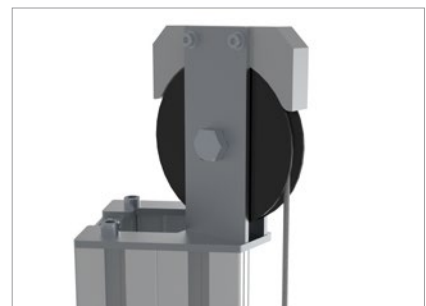
**CE conformity
included**

The lifting gates provide space-saving personnel and equipment protection that adapts to customer requirements. This secured lifting gate facilitates access to the enclosed equipment without the need for additional automation. The lifting gate can be easily integrated into all safety fence systems.

The lifting gate can be manufactured with three different openings and consists of a stable aluminum profile construction. Opening and closing is done manually by hand. Thanks to the flexible system, many different fillings are possible. The modular design, easy and simple installation and unlimited expandability are just some of the advantages of this product.



Simple locking



Pulleys with lift-off protection



Optional RFID safety sensor

Features

- ✓ Fillings: Polycarbonate, sheet metal, aluminum composite panels and glass, can be used in the same way as the safety fence system
- ✓ Various guide variants such as plastic or brass rollers and linear rails as well as much more
- ✓ Special sizes and designs are possible
- ✓ Safety sensors up to PLe can be supplied already pre-assembled

Automated Lifting Gates

for the separation of danger zones

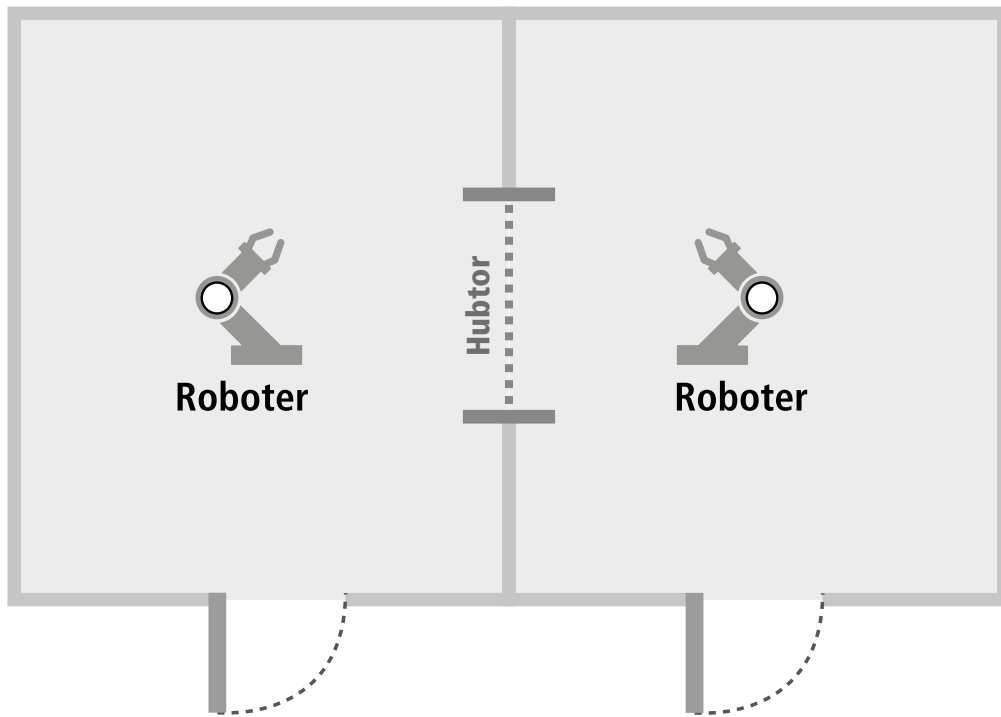
CE conformity
included



Safety switch



I/O link or Profinet connection



The automated lifting gates are the ideal solution for the separation between protected areas. They are mainly used in interlinked robot systems. Thus, when opened, the robots can work together, e.g. hand over workpieces. When closed, access to a single protected area is enabled without shutting down the second area.

The movable part of the partition wall is equipped with a Makrolon filling, which reliably protects against flying sparks, for example in welding robots, but still allows process monitoring. The safety switch keeps the lifting gate securely closed in the end position, thus enabling small safety clearances.

Activation is carried out via an I/O link, which can be configured, or via a professional interface. The counterweights allow the use of a motor with reduced driving force and prevent the gate from falling. This significantly reduces the risk of shearing and crushing. The lift gate and components are delivered fully assembled, pre-wired, tested and configured. In this way, the gate only has to be activated. A final quality test is done on each lifting gate before delivery.

Features

- ✓ No risk of crushing & shearing during maintenance
- ✓ Finished widths 1500 mm to 5000 mm, as well as special dimensions
- ✓ Murr Fusion distributor box for quick connection of all components
- ✓ No interference surface for the cable duct (freely positionable)

High Speed Gates



High-speed gates for personal and machine protection

The space-saving high-speed gates can be optimally combined with safety fence systems and easily integrated into the system.

In addition, the access can be equipped with an integrated light beam. Alternatively, electrical safety edges with wireless connection are used for protection

Integrated light beam

The integrated light beam detects interfering contours in the door area at time and triggers the stop of the door drive with reverse operation. This prevents a collision.



Safety

- ✓ Patented, wear-free thrust protection
- ✓ The gate panel can only be pushed in to a limited extent, so that safety clearances behind the door can be minimized
- ✓ The floor support is safely monitored via a non-contact safety sensor (Cat.4 + PL e)
- ✓ Integrated light beam or alternatively electrical safety edge with wireless connection
- ✓ No risk of crushing and shearing on the floor support
- ✓ Connection to safe bus systems such as Profinet or the Safety Simplifier is possible



Function

- ✓ Alternative drive systems with or without frequency inverter control
- ✓ The motor can be mounted in various positions: Below, above, in front or behind
- ✓ Simple and freely adjustable end position detection
- ✓ Efficient stop holder with damping effect



The gate control can be combined with a safety controller

Rolling Gates

Rolling gates enable automated work processes, a reduction in downtime and productivity increase as a result.

Rolling up the safety gate creates a significant space advantage, so that the rolling gates can fit even in restricted space conditions.

Whether standard solutions or individual requirements, we offer the right gate for every application.

The most important features at a glance

- ✓ Safe separation between people and danger zones
- ✓ Enables loading during the production process and avoids downtimes as a result
- ✓ Space-saving
- ✓ Designed for continuous operation
- ✓ Electrical protection or control according to individual requirements



Rolling gate made of anodized sturdy aluminum slats

Switches and Adapter Fittings

Matching the safety fence system, we offer a wide portfolio of safety switches with and without guard locking function for securing of access doors. In addition, a wide range of mounting plates is available for all switches commonly used on the market.



Safety switch with key transfer system and with control elements: The matching mounting plate is available as equipment for each switch configuration. Thanks to its slim design, the safety switch can also be mounted directly on the aluminum profile.



The safety sensor is equipped with a mounting bracket that fits exactly on the aluminum profile systems.

DID YOU KNOW...

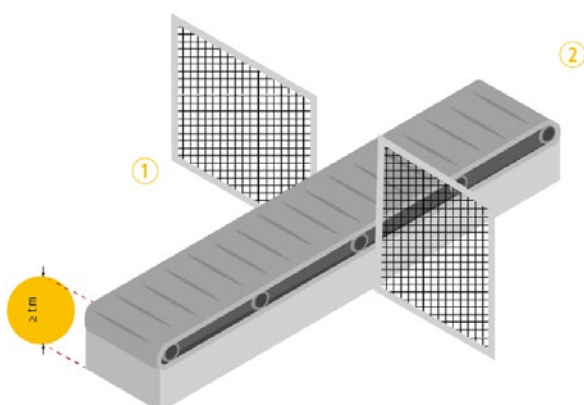


... that continuous conveyors with a height of 1 m or more are classified as non-overclimbable?

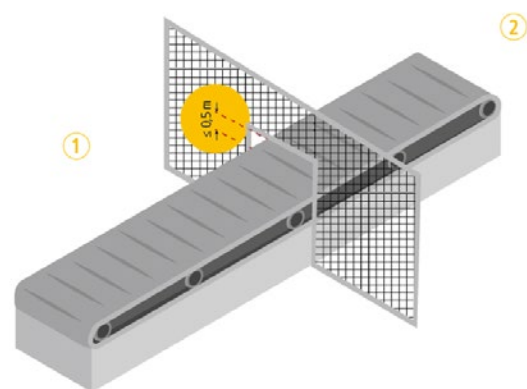
The C standard DIN EN 619 "Continuous handling equipment and systems - Safety and EMC requirements for equipment for mechanical handling of unit loads" provides various information and highlights typical hazards. A protective enclosure with a height of only one meter should not be used without further measures to prevent overclimbing.

What is the situation now with a breakthrough in the protective enclosure for a conveyor belt?

The annexes to the standard describe that the continuous conveyor must be mounted **stationary**. **Access must be prevented under and next to the conveyor, e. g. by means of a separating guard.** The conveyor must be set up in such a way that it is prevented from climbing over. Now, if the conveyor is higher or exactly one meter from the reference level, then no further action is required. Nevertheless, the corresponding safety clearances must be observed with regard to gripping. If at certain points on continuous conveyors can be expected that loading and unloading points can be misused as access to danger zones, the access must be prevented or made more difficult in accordance with a risk assessment. Of course, it should be ensured that the employee definitely has a possibility to get into the plant. An optimal solution is always secured access without incentive for manipulation.



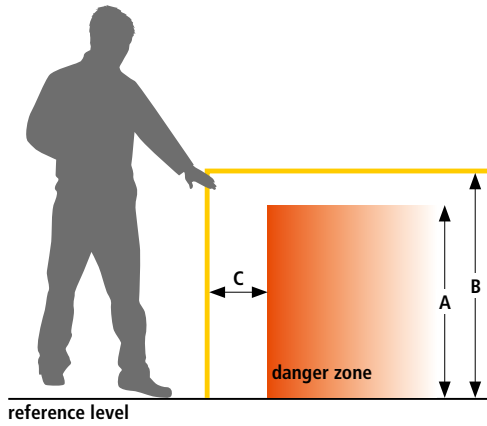
- 1 Arbeits- und Gefahrenbereich
- 2 Verkehrsbereich



- 1 Arbeits- und Gefahrenbereich
- 2 Verkehrsbereich

If the height of the load infeed/outfeed point is 0.5 m or less and the safety clearances comply with EN 13857, no further protective measures are required i.e. the conveyor system can also be <1m. If the dimensions deviate from this, further safety measures must be taken.

Safety distances



Passing over protective constructions at high and low risk

- A Height of the hazardous area
- B Height of the protective structure
- C Horizontal safety distance to the danger zone

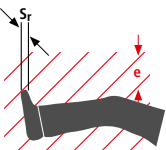
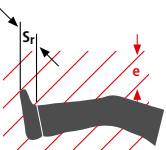
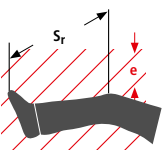
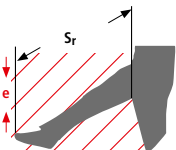
A Height of the danger zone	B Height of the protective structure									
	1000	1200	1400	1600	1800	2000	2200	2400	2600	2700
	C Horizontal safety distance to the danger zone									
2700	—	—	—	—	—	—	—	—	—	—
2600	900	800	700	600	600	500	400	300	100	—
2400	1100	1000	900	800	700	600	400	300	100	—
2200	1300	1200	100	900	800	600	400	300	—	—
2000	1400	1300	1100	900	800	600	400	—	—	—
1800	1500	1400	1100	900	800	600	—	—	—	—
1600	1500	1400	1100	900	800	500	—	—	—	—
1400	1500	1400	1100	900	800	—	—	—	—	—
1200	1500	1400	1100	900	700	—	—	—	—	—
1000	1400	1000	900	300	—	—	—	—	—	—
800	1300	900	600	—	—	—	—	—	—	—
600	1200	500	—	—	—	—	—	—	—	—
400	1200	300	—	—	—	—	—	—	—	—
200	1100	200	—	—	—	—	—	—	—	—
0	1100	200	—	—	—	—	—	—	—	—

Table acc. to EN ISO 13857

- low risk
- high risk

- Protective constructions with a height of less than 1000 mm are not included, as they do not sufficiently restrict movement.
- In case of high risk, protective constructions lower than 1400 mm should not be used without additional safety measures.

Safety distances against reaching danger points with the lower limbs according to EN ISO 13857

	tip of the toe		toe	foot		leg (toe to knee)	leg (tiptoe to crotch)	
Safety distance (S_r)								
Opening 2	$e \leq 5$	$5 < e \leq 15$	$15 < e \leq 35$	$35 < e \leq 60$	$60 < e \leq 80$	$80 < e \leq 95$	$95 < e \leq 180$	$180 < e \leq 240$
Slot	0	≥ 10	≥ 80 1	≥ 180	≥ 650 2	≥ 1100 3	≥ 1100 3	not allowed
Square or circle	0	0	≥ 25	≥ 80	≥ 180	≥ 650	≥ 1100 3	≥ 1100 3

- 1** If the length of a slot-shaped opening is ≤ 75 mm, the safety distance can be reduced to ≥ 50 mm.
- 2** The value refers to "toe to knee".
- 3** The value refers to "toe to crotch".

Slot-shaped openings with $e > 180$ mm and square or circular openings with $e > 240$ mm allow access of the entire body.

Safety clearances

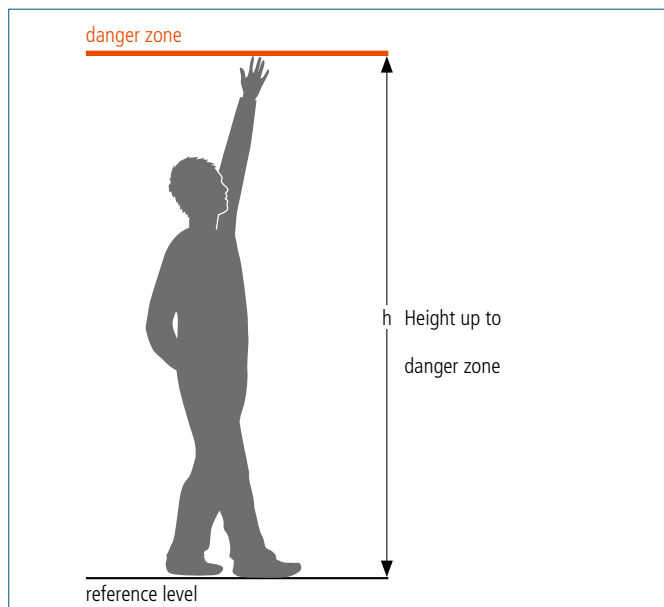
Safety clearances to prevent danger zones being reached with the upper limbs

Safety clearances when passing through regular openings

Safety distance (S_r)	Fingertip		Finger to finger root			Hand		Arm to shoulder joint	
Opening 2	$e \leq 4$	$4 < e \leq 6$	$6 < e \leq 8$	$8 < e \leq 10$	$10 < e \leq 12$	$12 < e \leq 20$	$20 < e \leq 30$	$30 < e \leq 40$	$40 < e \leq 120$
Slot	≥ 2	≥ 10	≥ 20	≥ 80	≥ 100	≥ 120	≥ 850 1	≥ 850	≥ 850
Square	≥ 2	≥ 5	≥ 15	≥ 25	≥ 80	≥ 120	≥ 120	≥ 200	≥ 850
Circle	≥ 2	≥ 5	≥ 5	≥ 20	≥ 80	≥ 120	≥ 120	≥ 120	≥ 850

- If the length of a slot-shaped opening is ≤ 65 mm, the thumb acts as a limit and the safety distance can be reduced to 200 mm.
 - The dimensions of the openings e correspond to the side of a square, the diameter of a circular and the smallest dimension of a slot-shaped opening.
- For openings > 120 mm, the safety distances must be applied when passing over protective structures.
 - The thicker lines in the table limit the body part that is restricted by the size of the opening.
- All protective devices must be equipped and arranged in such a way that the safety distances do not change. The dimensions given have been determined under the condition that no aids such as boxes, chairs or ladders are used to reach the danger zone.
 - A risk assessment must be carried out acc. to DIN EN ISO 12100 to determine the necessary safety distances.
 - If the table values for a, b or c are between two values, the values which give the higher level of safety shall be applied.

Safety distances when reaching up



Before safety distances, that prevent persons from reaching danger zones, are determined, it is necessary to decide whether to use high or low risk values. A risk assessment (see ISO 12100) must therefore be carried out. Low risks result only from hazards, such as friction or abrasion, where long-term damage or irreversible injury to the body are not expected.

Low risk

$h \geq 2500$ mm

High risk

$h \geq 2700$ mm

or other technical safety measures.

Safety Clearances

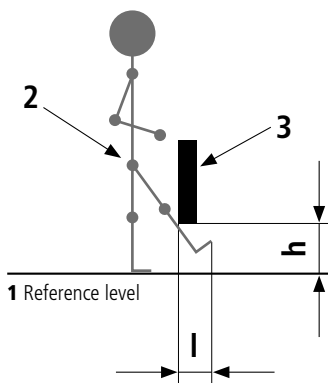
Clearances to prevent free access through the lower limbs

An additional protective structure may be used to restrict free access of the lower limbs under existing protective structures. For this procedure, the distances given in this annex refer to the height from the floor or reference plane to the

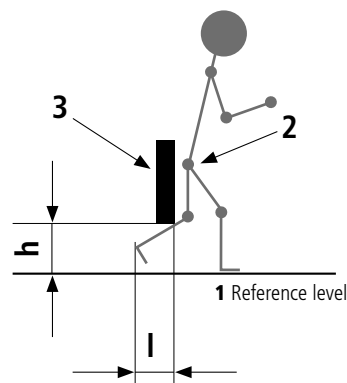
protective construction. This procedure provides limited protection; in many cases other procedures may be more appropriate.

Note: These clearances are not safety clearances and additional precautions may be required to limit access.

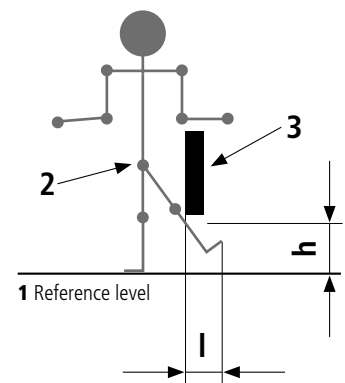
Case 1



Case 2



Case 3



1 Reference level 2 Hip joint 3 protective design h Height to the protective design l Blocking distance

Prevention of free movement under protective constructions

This table contains distances for special cases where lower limb access is restrained for the person remaining in an upright position without any additional assistance. Where there is a risk of slipping or misuse, the use of the values given in the table may be inappropriate.

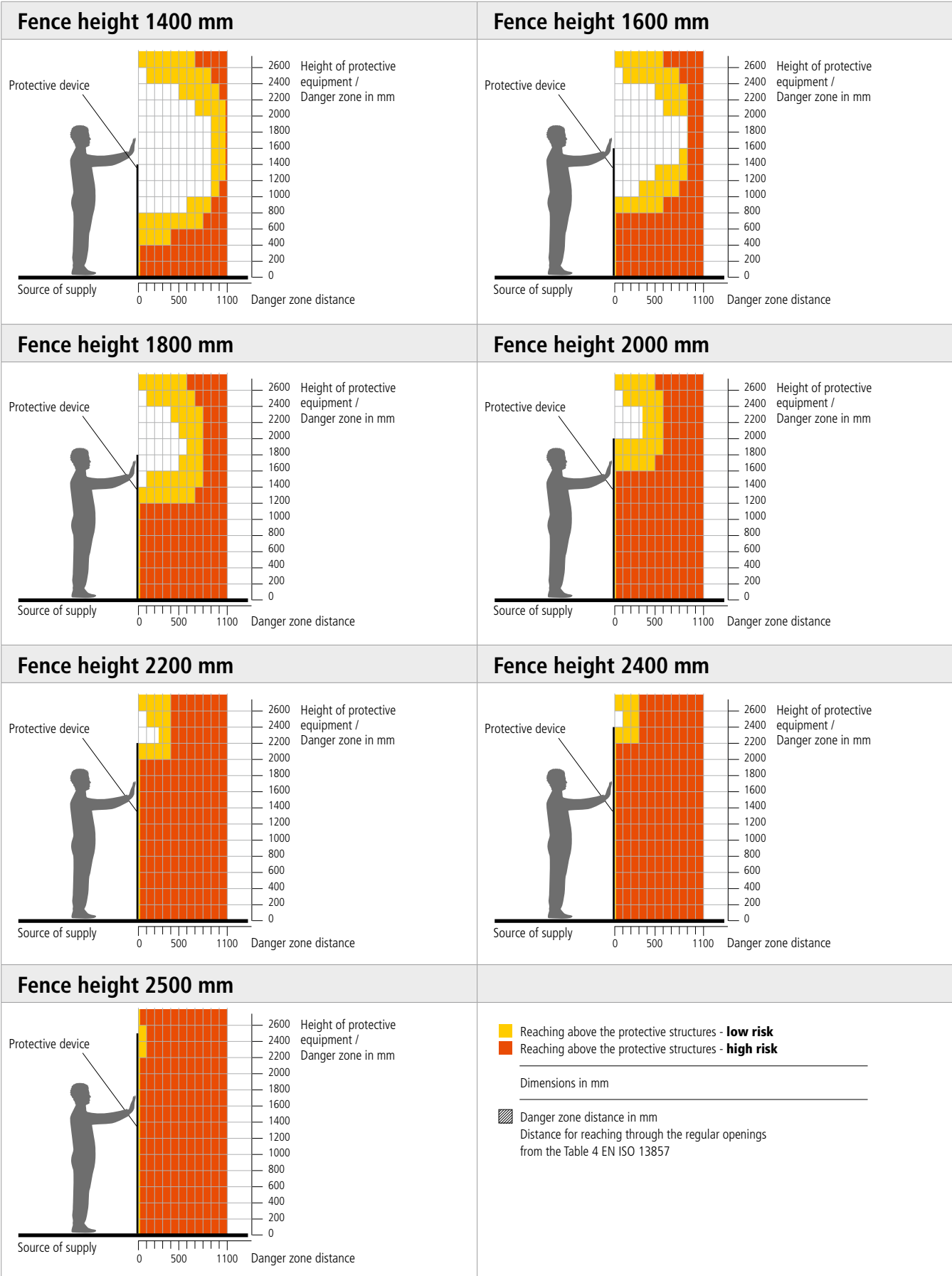
No interpolation should be performed between the values in this table. If the height **h** to the protective structure is between two values, the distance for the higher value of **h** should be applied.

Distances where lower limb access is limited				Dimensions in mm
Height h to the protective structure	Distance l			
	Case 1	Case 2	Case 3	
$h \leq 200$	≥ 340	≥ 665	≥ 290	
$200 < h \leq 400$	≥ 550	≥ 765	≥ 615	
$400 < h \leq 600$	≥ 850	≥ 950	≥ 800	
$600 < h \leq 800$	≥ 950	≥ 950	≥ 900	
$800 < h \leq 1000$	≥ 1125	≥ 1195	≥ 1015	

Note: Slot-shaped openings with $e > 180$ mm and square or circular openings with $e > 240$ mm allow access for the whole body.

Safety clearances to prevent the overreach of protective devices

Danger zones and safety clearances for our safety fence systems
with the filling variant sheet metal, real glass or polycarbonate



Safety clearances to prevent the overreach of protective devices

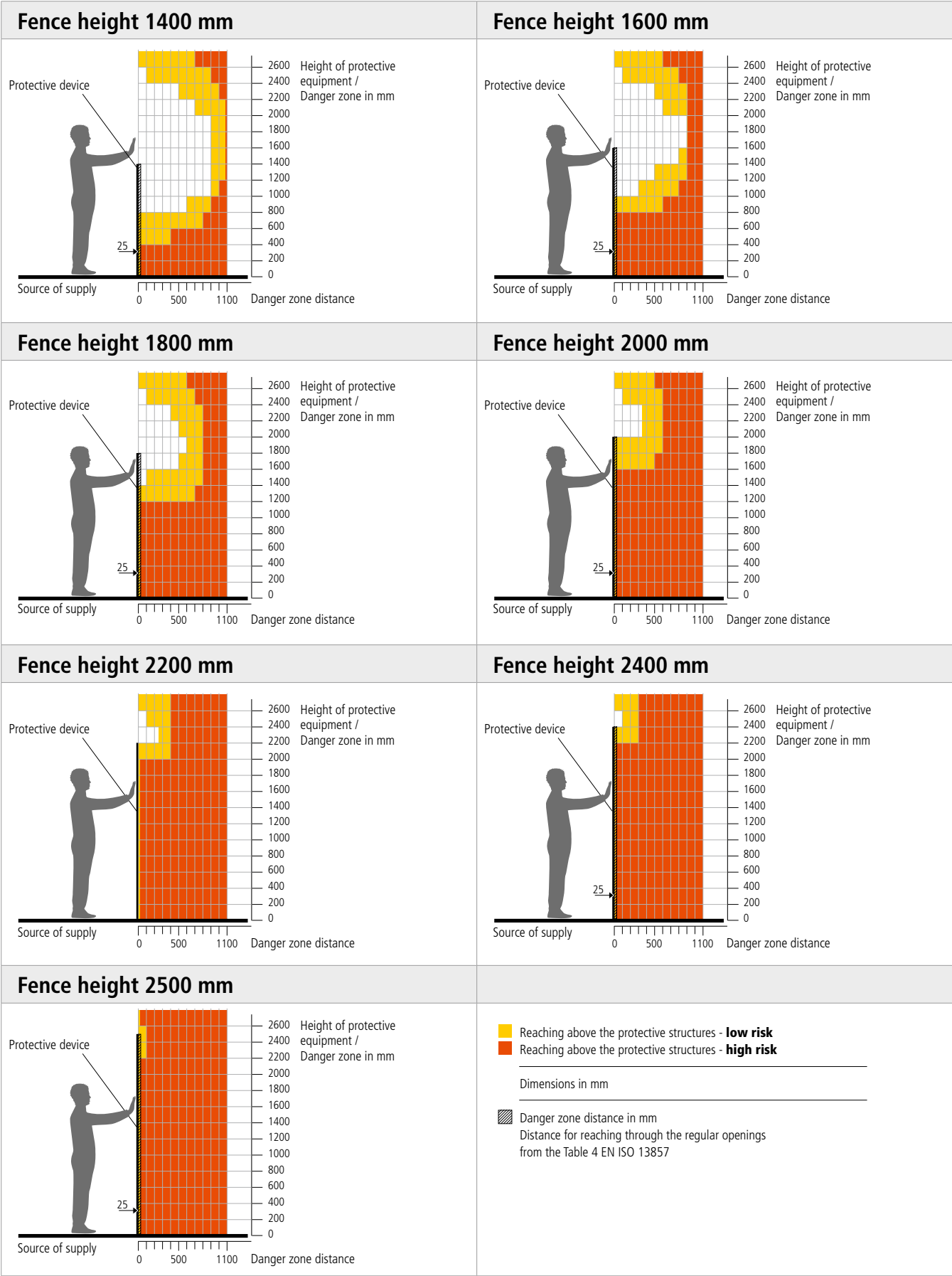
Danger zones and safety clearances for our safety fence systems

with the filling variant corrugated grid/spot welding grid 40 x 40 mm

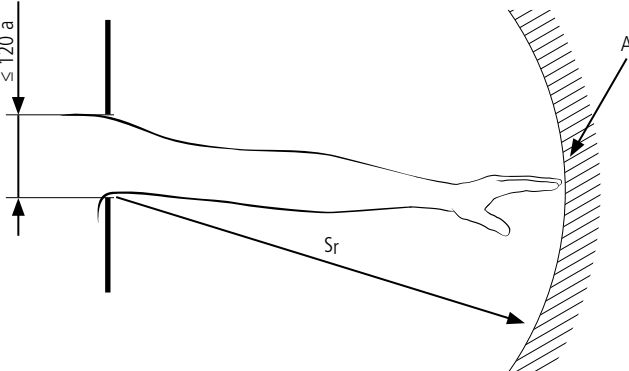
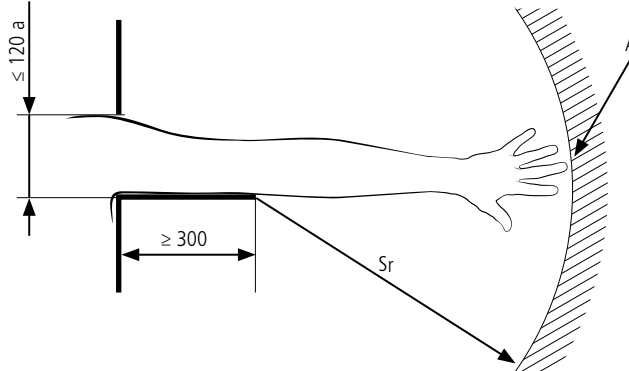
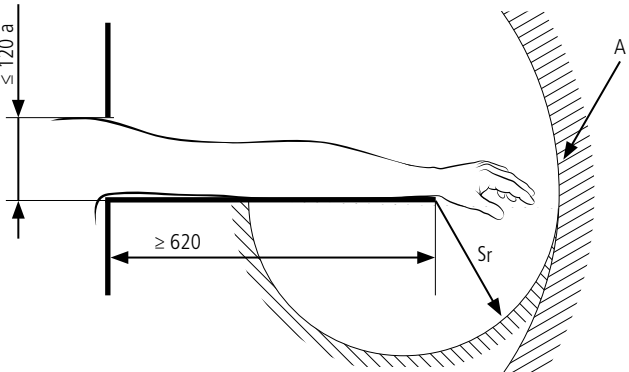
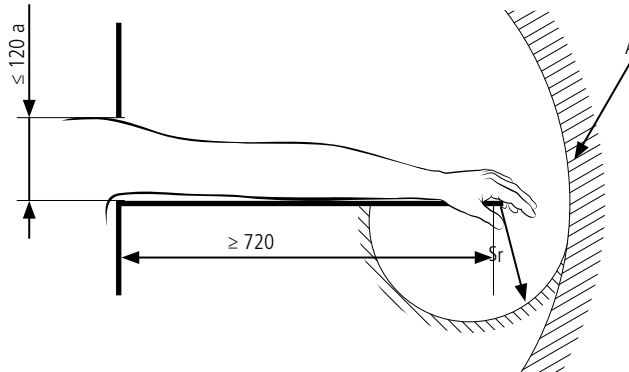


Safety clearances to prevent the overreach of protective devices

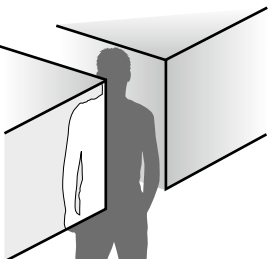
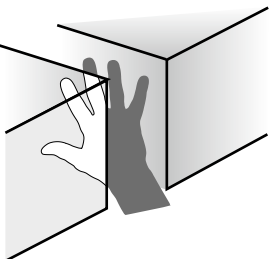
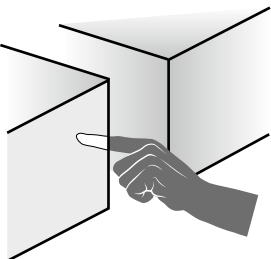
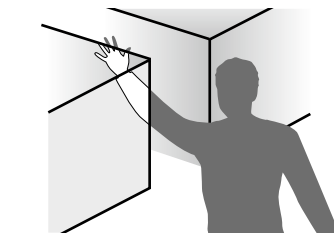
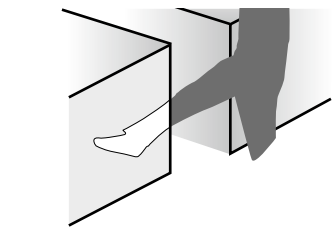
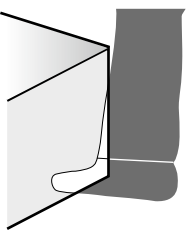
Danger zones and safety clearances for our safety fence systems
with the filling variant perforated plate Qg10-14



Safety clearances

Reaching around with limited movement			
 Limiting the movement only on the shoulder and armpit. Safety clearance $S_r \geq 850$ mm	 Limiting the movement Arm supported up to the elbow. Safety clearance $S_r \geq 550$ mm		
 Limiting the movement arm supported up to the wrist. Safety clearance $S_r \geq 230$ mm	 Limiting the movement arm and hand supported up to the finger root. Safety clearance $S_r \geq 230$ mm		

A Range of movement of the arm
 S_r radial safety distance
 a This is either the diameter of a circular opening or the side of a square one
 Opening or the width of a slot-shaped opening

Minimum distances to avoid crushing of body parts					
 Body ≥ 500 mm, head ≥ 300 mm	 Fist, hand, wrist ≥ 100 mm	 Finger ≥ 25 mm			
 Arm ≥ 120 mm	 Leg ≥ 180 mm	 Foot ≥ 120 mm			

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