



Brühl

Safety of machinery

Guide through the standards

First in safety.



First in safety.

Safety of Machinery Guide through the Standards

Safety is more than just a business to us.
Safety is our drive and our promise to you.

For over 40 years, we have been shaping the protection of people and machinery. With our high-quality protective fence systems, we are continually setting new standards as one of the leading and largest manufacturers in Europe.

Flexible, comprehensive, and – when required – completely bespoke, we develop and produce machine and plant solutions that combine durability, functionality, and safety. To achieve this, we rely not only on our accumulated expertise but also on a wide range of certification and testing

procedures to make our customers' everyday work safer. We do this with a clear commitment to developing and promoting safety – for ourselves, our customers, and our partners. To ensure you're always on the safe side, Brühl offers you all services relating to machine and plant protection systems from a single source – proudly bearing the “Made in Germany” seal.

This brochure always reflects the most current versions of the standards.

Safety of Machinery

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/01

Safety of Machinery

General Standards

C standards

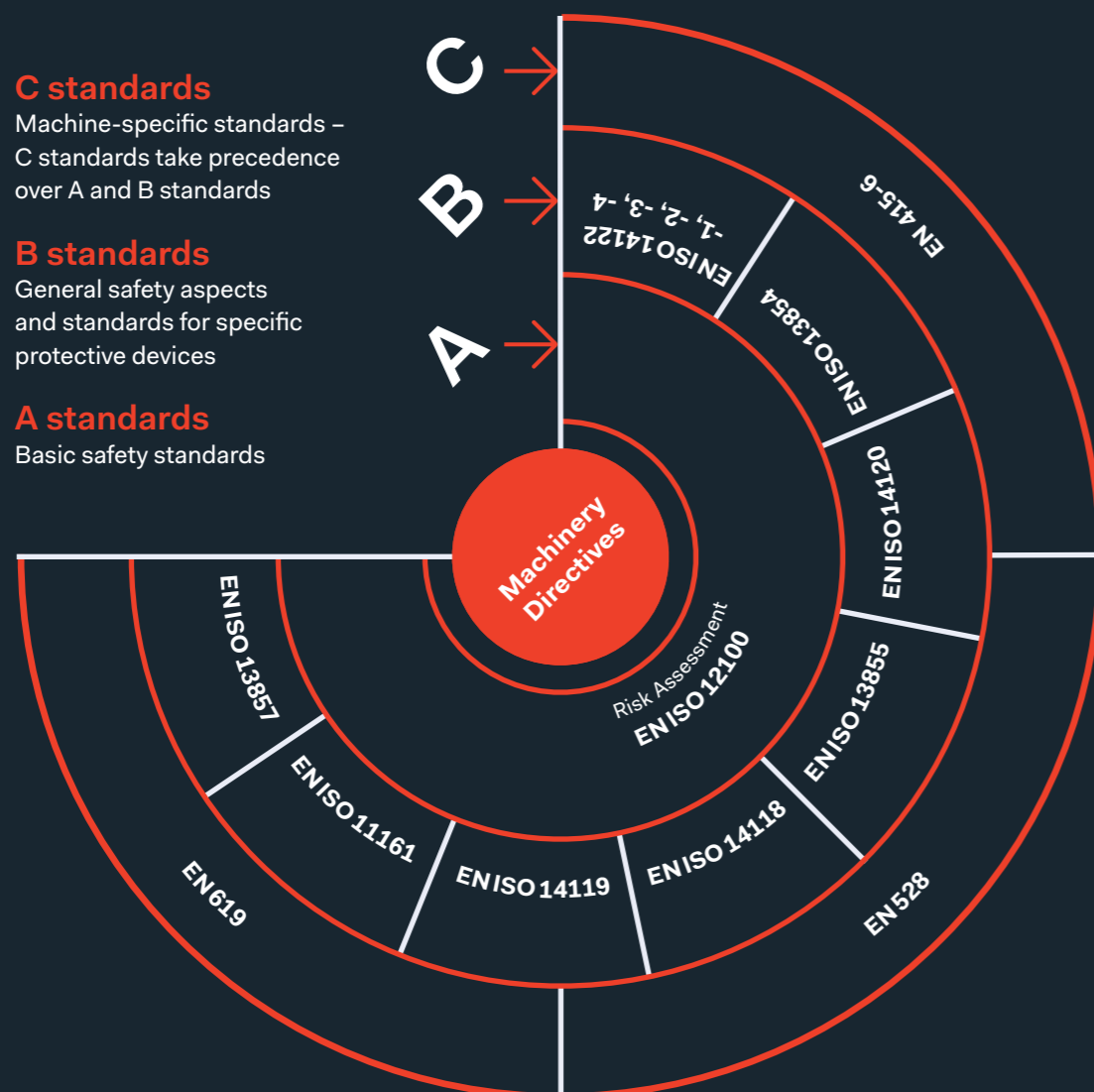
Machine-specific standards – C standards take precedence over A and B standards

B standards

General safety aspects and standards for specific protective devices

A standards

Basic safety standards



/01.1 General Standards

Standards on Machinery Safety as of Dec. 2024

A standards

EN ISO 12100	Safety of machinery – General design principles – Risk assessment and risk reduction
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B standards

EN ISO 13854	Safety of machinery – Minimum gaps to avoid crushing of parts of the human body
EN ISO 14118	Safety of machinery – Prevention of unexpected start-up
EN ISO 11161	Safety of machinery – Integrated manufacturing systems – Basic requirements
EN ISO 13855	Safety of machinery – Positioning of safeguards with respect to the approach speeds of body parts
EN ISO 13857	Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs
EN ISO 14119	Safety of machinery – Interlocking devices associated with guards – Principles for design and selection
EN ISO 14120	Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards
EN ISO 14122-1	Safety of machinery – Permanent means of access to machinery – Part 1: Choice of fixed means of access between two levels
EN ISO 14122-2	Safety of machinery – Permanent means of access to machinery – Part 2: Working platforms and walkways
EN ISO 14122-3	Safety of machinery – Permanent means of access to machinery – Part 3: Stairs, stepladders and guardrails
EN ISO 14122-4	Safety of machinery – Permanent means of access to machinery – Part 4: Fixed ladders

Examples of C standards

EN 415	Safety of packaging machines – Parts 1 to 10
EN 528	Rail dependent storage and retrieval equipment – Safety requirements
EN 619	Continuous handling equipment and systems – Safety and EMC requirements for mechanical handling devices for unit loads
EN ISO 10218	Industrial robots – Safety requirements
EN 12453	Doors – Safety in use of power operated doors – Requirements

Additional standards

EN 12604	Doors – Mechanical aspects – Requirements and test methods
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/01.2 General Standards

The New EU Machinery Regulation MVO 2023/1230/EU

The EU Machinery Regulation (MVO) was published in the Official Journal of the European Union on 29 June 2023 and entered into force on 19 July.

The decisive factor for applying the MVO is the date the machinery is placed on the market. If machinery and related products are put into operation from 20 January 2027 onwards, all requirements stated in the MVO must be met and confirmed through the MVO Declaration of Conformity. If products are placed on the market before 20 January 2027, the Declaration of Conformity must comply with the requirements of the current Machinery Directive.

To avoid complications concerning the cut-off date, it is possible to issue a Declaration of Conformity for products placed on the market before 20 January that meets the requirements of both the Machinery Directive and the Machinery Regulation. No transitional period has been defined between the Machinery Directive 2006/42/EC and the EU Machinery Regulation MVO. The key innovations are summarised briefly below.

/1

Term “Substantial Modification”

The newly introduced term “substantial modification” refers to a “physical or digital change to a machinery product, not foreseen by the manufacturer after it has been placed on the market or put into service, which may affect compliance with the essential health and safety requirements.” This also applies to modernisations carried out by the manufacturer. The use of a simple separating guard does not constitute a substantial modification.

This definition helps companies assess when a modified machine is considered “new” under the regulation. In such cases, the conformity assessment procedure for CE marking must be carried out again.

/2

Term “High-Risk Machinery” According to MVO, Annex I

Article 6 of the MVO defines classification rules for high-risk machinery. These are machines which, considering their design and intended use, pose a high risk to human health. A definitive list of the machinery to which this applies can be found in Annex I.

/3

Presumption of Conformity through Technical Specifications

The presumption of conformity for machinery through the application of harmonised standards or parts thereof, as already provided by the current Machinery Directive 2006/42/EC, remains in place.

To ensure the presumption of conformity in cases where harmonised standards are not (yet) available, the EU Commission may in future also issue technical specifications, which likewise trigger a presumption of conformity.

/4

Digital Operating Instructions and Declaration of Conformity

The MVO provides that manufacturers may supply operating instructions and declarations of conformity in a printable digital format only. However, a paper version must be provided upon customer request. Furthermore, Annex III, Chapter 1.7.4 of the MVO sets out fundamental (mandatory) requirements for operating instructions and information. (New: Paragraph “W”: Emission of hazardous substances)

/5

Risk Assessment for Machines with Autonomous Behaviour

A new requirement is that for machines exhibiting evolving and autonomous behaviour, the risk assessment must also consider risks that may arise after the machine has been placed on the market due to its autonomous and evolving characteristics.

/6

Requirements for OT Security

Manufacturers of machinery must take precautions against risks arising from malicious actions by third parties that could affect machine safety. This applies to manipulations via the connection to or communication with other hardware, as well as to the machine software (e.g. hacker attacks). For this purpose, the MVO introduces a new essential health and safety requirement (Annex III, Chapter 1.1.9).

/7

Safety and Reliability of Control Systems

The requirements for the safety and reliability of (machine) control systems have been further specified (Annex III, Chapter 1.2.1). This particularly concerns provisions related to software.

/8

Requirements for Human-Machine Interaction

The health and safety requirements related to ergonomics have been expanded and adapted to include aspects of human-machine interaction (Annex III, Chapter 1.1.6). When a machine is used as intended, nuisance, fatigue, as well as physical and mental strain on the operator must be reduced to the lowest possible level.

/9

Risks from Moving Parts and Psychological Stress (Collaborative Machines)

The moving parts of a machine must be designed and constructed in such a way that the risk of accidents due to contact with these parts is prevented. If risks still exist, the moving parts must be equipped with separating or non-separating protective devices. The use of specific protective devices must be indicated in the operating instructions and, where possible, on the machine itself.

/10

Machines with Evolving Capabilities (AI Systems)

The risks associated with AI systems are regulated by the EU Artificial Intelligence Regulation AI Regulation 2024/1689/EU. Nevertheless, the MVO also includes provisions for AI systems in order to consider interactions between machine components.



/01.3 General Standards

Product Standard Reference for Selected Brühl Protective Fence Systems

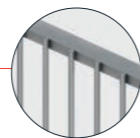
Flexible-width grid panels can be trimmed in width in 23 mm increments
EN ISO 14120; 5.3.7



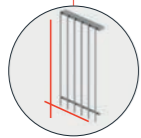
Angled fence panels e.g. for conveyor inlets and outlets
EN ISO 14120; 5.3.2/5.3.7



High stability with low weight Grid elements are made of wires and flat bars
EN ISO 14120; 5.4.3/5.2.5.2



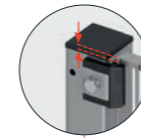
Modern design through flush fence alignment. Posts not obscured by fence elements, minimal overall fence depth
EN ISO 14120; 5.3.7/5.2.3



High planarity Optimal process visibility Through frameless design With a slot-shaped opening of 20x200 mm
EN ISO 14120; 5.2.2/5.2.4/5.9



Integrated height compensation
EN ISO 14120; 5.2.2



Non-detachability of fasteners Tabs remain attached to the grid mat with screws
EN ISO 14120; 5.19/5.4.4/5.3.8



Removal only with tools Tabs can only be removed using a tool
EN ISO 14120; 5.3.9/8.5



High torsional rigidity/stability (door-) frame elements consist of mitre-welded profile frames (no open frame profiles) with welded-in or inserted infills
EN ISO 14120; 5.4.3

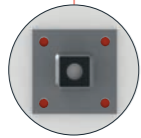


Maximum shock resilience of the coating structure through sand-blasted and powder-coated elements
EN ISO 14120; 5.6

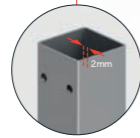
Colour variety in different colours and available hot-dip galvanised
EN ISO 14120; 5.9/5.2.4/5.22/5.23

Flexible adaptation Elements can be placed side by side or one above the other (e.g. cut-outs, edgings, separation points)
EN ISO 14120; 5.2.1/5.3.1/5.3.7

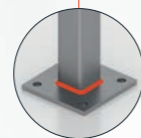
Stable four-hole base plate for secure floor mounting
EN ISO 14120; 5.4.2/5.1.3/5.3.8/5.4.3/5.4.4



Robust post profile thickness of at least 2.0 mm
EN ISO 14120; 5.1.3/5.4.2



Position-bound assembly through predefined threads in the post profile / prevention of incorrect assembly
EN ISO 13857; 4.2.2/4.3
EN ISO 14120; 5.2.6



Optimal stability through all-round welded connection of base plate and post profile
EN ISO 14120; 5.1.3/5.3.8/5.4.2/5.4.3



Flow-formed threads for secure fastening of elements
EN ISO 14120; 5.3.8/5.4.4



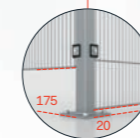
Easy alignment of the adjustment post via adjustment screws on slightly uneven ground, optionally available
EN ISO 14120; 5.2.1



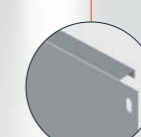
No protruding cross wires and therefore no climbing edges on fence elements
EN ISO 14120; 5.18



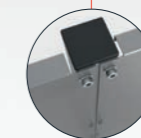
Single-panel dismantling without destabilising neighbouring panels
EN ISO 14120; 5.4.3



Varying ground clearances possible
EN ISO 13857; 4.3



High-quality sheet-metal walls made from laser-cut and bent sheet metal
EN ISO 14120; 5.4.3



Privacy screen sheet-metal walls resting on posts
EN ISO 14120; 5.1.3/5.1.4/5.1.5/5.1.6/5.3.7/5.5/5.16/5.17

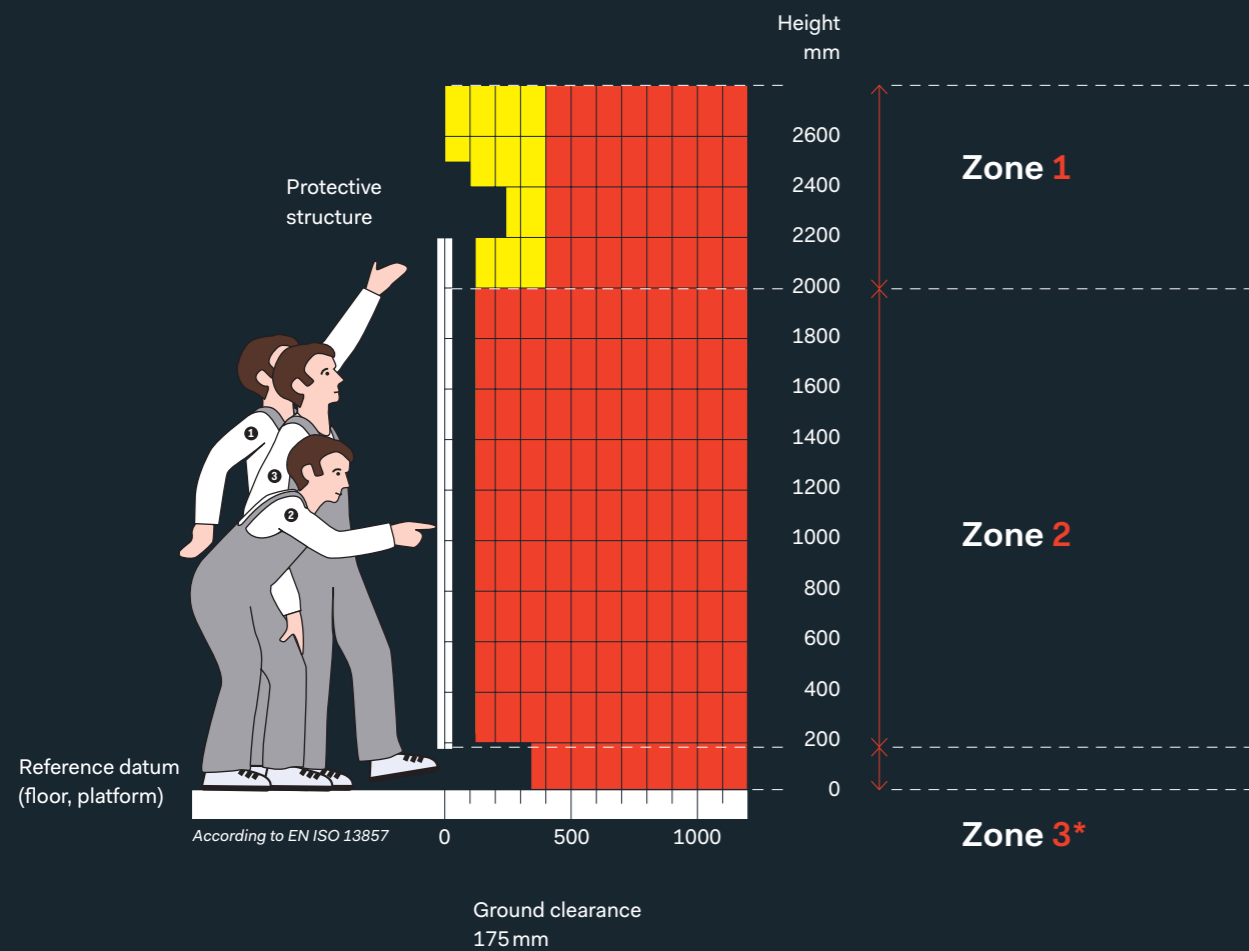
Full protection privacy, splash protection, small-parts protection, protection from glare, smoke, heat, dust, laser, drafts
EN ISO 14120; 5.1.3/5.1.4/5.1.5/5.1.6/5.3.7/5.5/5.16/5.17

View-window installation protective panes of polycarbonate, laminated safety glass, privacy pane and anti-puncture guard can be added
EN ISO 14120; 5.16/5.17/5.2.4/5.4.2/5.9/5.10

/02

Safety of Machinery

Safety Distances



/02.1 Safety Distances

Safety distance areas according to EN ISO 13857

Zone 1

EN ISO 13857, Clause 4.2.2 – Reaching over protective structures in high- and low-risk areas → see [Section 2.4](#)

Zone 2

EN ISO 13857, Clause 4.2.4.1 – Safety distances when reaching through regular openings Flex – opening 20×200 mm = safety distance 120 mm → see [Section 2.3](#)

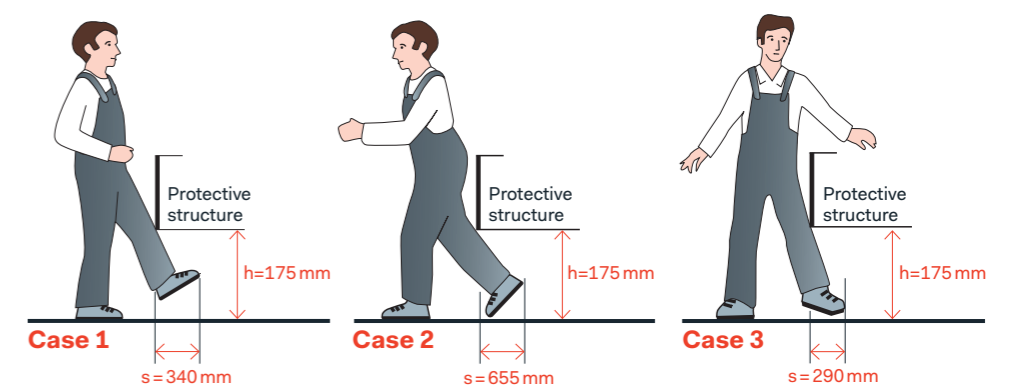
Zone 3

EN ISO 13857, Clause 4.3 – Safety distances when reaching through regularly shaped openings with lower limbs = safety distance 1100 mm → see [Section 2.8](#)

The illustration shows, according to Annex B **Case 1** (distance 340 mm). Where applicable, consider **Case 2** (655 mm) or **Case 3** (290 mm) in the following figure:

Limitation of access by lower limbs at a ground clearance of 175 mm

According to EN ISO 13857:2020-04-06



/02.2 Safety Distances

Note from EN ISO 11161 on the design requirements for protective devices

According to EN ISO 13857

Protective devices must be designed and constructed in accordance with EN ISO 14120. The following dimensions must be observed unless other requirements apply:

In areas where human access is not required, the height of fixed and movable separating protective devices must be at least 1400 mm (if permitted by the risk assessment and no hazard zones can be reached by reaching over).

In areas where access to machinery is required, the height of fixed and movable separating protective devices must be at least 1000 mm.

The gap between the protective device and the floor must not exceed 200 mm. → See also Section 2.8

/02.3 Safety Distances

Safety distances when reaching through regular openings

According to EN ISO 13857, Table 4

1 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.

2 The dimensions of the openings e correspond to the side of a square opening, the diameter of a circular opening, and the smallest dimension of a slot-shaped opening.

i For openings > 120 mm, the safety distances for reaching over protective structures must be applied.

i The bold lines in the table indicate the body part restricted by the size of the opening.

A Flex $\leq 20 \times 200$ mm

B Frame with wave grid 25×25 mm

C Frame with wave/welded grid $\leq 40 \times 40$ mm

D Frame with sheet metal

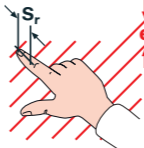
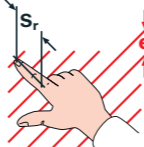


E Frame with perforated sheet

F Aluminium with polycarbonate

G Wall

* Slot-shaped opening between fence element and post ≤ 12 mm

i Information applies to persons aged 14 and over

	Opening 2	Sr Safety Distance		
		Slot	Square	Circle
Fingertip 	$e \leq 4$ mm	≥ 2 mm G	≥ 2 mm	≥ 2 mm
	$4 < e \leq 6$ mm	≥ 10 mm	≥ 5 mm	≥ 5 mm
Finger to base of finger 	$6 < e \leq 8$ mm	≥ 20 mm	≥ 15 mm	≥ 5 mm
	$8 < e \leq 10$ mm	≥ 80 mm	≥ 25 mm	≥ 20 mm
Hand 	$10 < e \leq 12$ mm	≥ 100 mm D E F	≥ 80 mm	≥ 80 mm
	$12 < e \leq 20$ mm	≥ 120 mm A	≥ 120 mm	≥ 120 mm
	$20 < e \leq 30$ mm	≥ 850 mm 1	≥ 120 mm B	≥ 120 mm
Arm to shoulder joint 	$30 < e \leq 40$ mm	≥ 850 mm	≥ 200 mm C	≥ 120 mm
	$40 < e \leq 120$ mm	≥ 850 mm	≥ 850 mm	≥ 850 mm

/02.4 Safety Distances

Reaching over protective structures in high and low risk areas

According to ENISO 13857

All protective devices must be equipped and arranged in such a way that safety distances are not altered. The dimensions apply on the condition that no aids (boxes, chairs, ladders) are used to reach the hazard zone.

To determine the required safety distances, a risk assessment must be carried out in accordance with ENISO 12100.

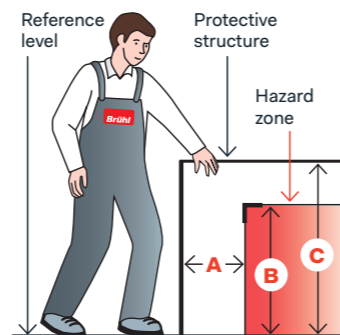
i If the table values for **A**, **B** or **C** fall between two values, those yielding the higher safety level must be used.

i Protective structures with a height below 1000 mm are not included, as they do not sufficiently restrict movement.

i Protective structures lower than 1400 mm should not be used in high-risk areas without additional safety measures.

i This table is compiled from Tables 1 and 2 of the standard.

B Height of the hazard zone	C Height of the protective structure									
	1000	1200	1400	1600	1800	2000	2200	2400	2600	2700
	A Horizontal safety distance to the hazard zone – Low risk / High risk									
2700	-	-	-	-	-	-	-	-	-	-
2600	900	800	700	600	600	500	400	300	100	-
2500	1100	1000	900	800	700	600	400	300	100	-
2400	1100	1000	900	800	700	600	400	300	100	-
2200	1300	1200	1000	900	800	600	400	300	-	-
2000	1400	1300	1100	900	800	600	400	-	-	-
1800	1100	1000	900	900	600	-	-	-	-	-
1600	1500	1400	1100	900	800	500	-	-	-	-
1400	1300	1000	900	800	100	-	-	-	-	-
1200	1500	1400	1000	800	-	-	-	-	-	-
1000	1400	1000	900	300	-	-	-	-	-	-
800	1500	1300	900	600	-	-	-	-	-	-
600	1400	1300	800	-	-	-	-	-	-	-
400	1400	1200	400	-	-	-	-	-	-	-
200	1200	900	-	-	-	-	-	-	-	-
0	1100	200	-	-	-	-	-	-	-	-



/02.5 Safety Distances

Safety distances for Brühl protective fence systems

According to ENISO 13857

The following two pages show the safety distances for a selection of our protective fence systems – depending on the fence height and the opening sizes of the infills.

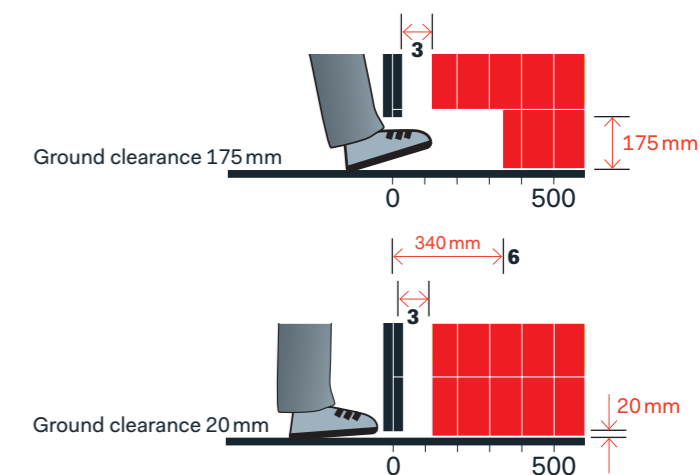
- Reaching over protective structure – low risk
- Reaching over protective structure – high risk

- 1 Protective device
- 2 Ground clearance
- 3 Distance to the hazard zone – distance corresponds to the requirements of the respective openings
- 4 Height of protective device or hazard zone (mm)
- 5 Reference level (floor, working platform)
- 6 ENISO 13857:2020-04 Clause 4.3: Safety distances when reaching through regularly shaped openings with the lower limbs

i Illustration shows Case 1 according to Annex B (distance 340 mm). Also consider Case 2 (655 mm) or Case 3 (290 mm) as applicable! → See illustrations in Sections 2.1 and 2.8

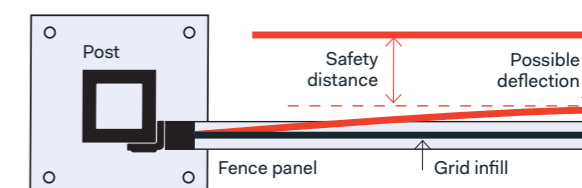
Brühl ground clearance for all protective fence systems

Ground clearance refers to the height between the floor and the bottom edge of the grid element. As standard, Brühl protective fence systems are designed with a ground clearance of 175 mm. Upon request, the ground clearance can be reduced to 20 mm.



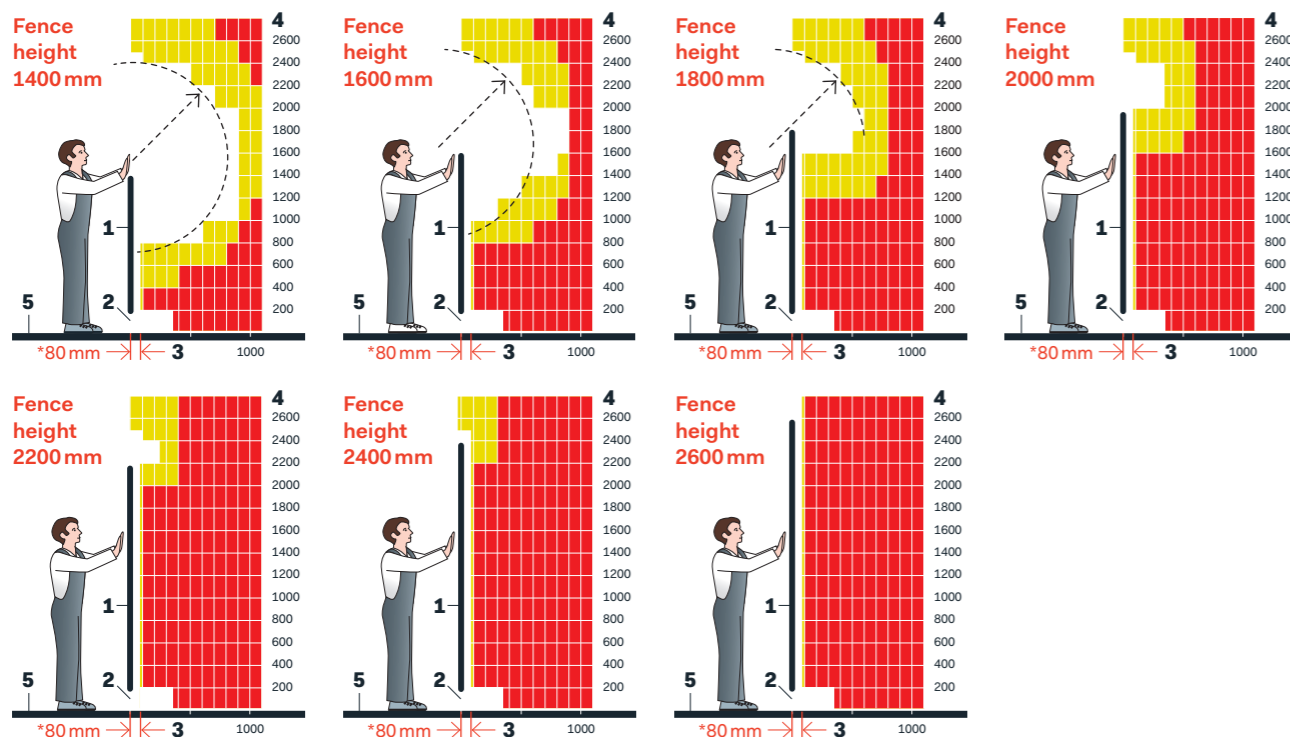
Considering the deflection of grid infills

Brühl recommends designing the safety distance to the rear edge of the grid, especially for grid infills, taking possible deflection into account.



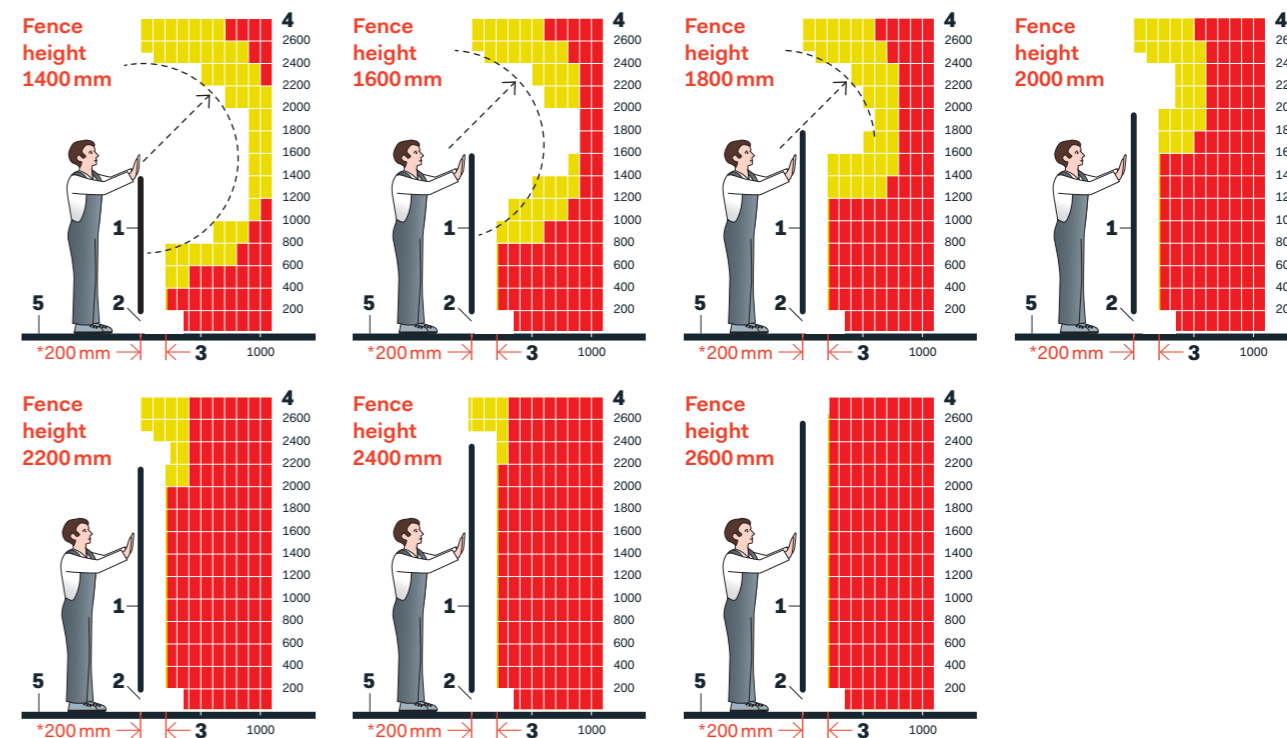
Protective fence system frame with sheet metal – slot-shaped opening, width 10 mm
Protective fence system frame with perforated sheet – opening 8×8 mm to 10×10 mm
Protective fence system frame with polycarbonate – slot-shaped opening, width 10 mm

*80 mm = distance to hazard zone of 80 mm required for slot-shaped openings with a width of 10 mm



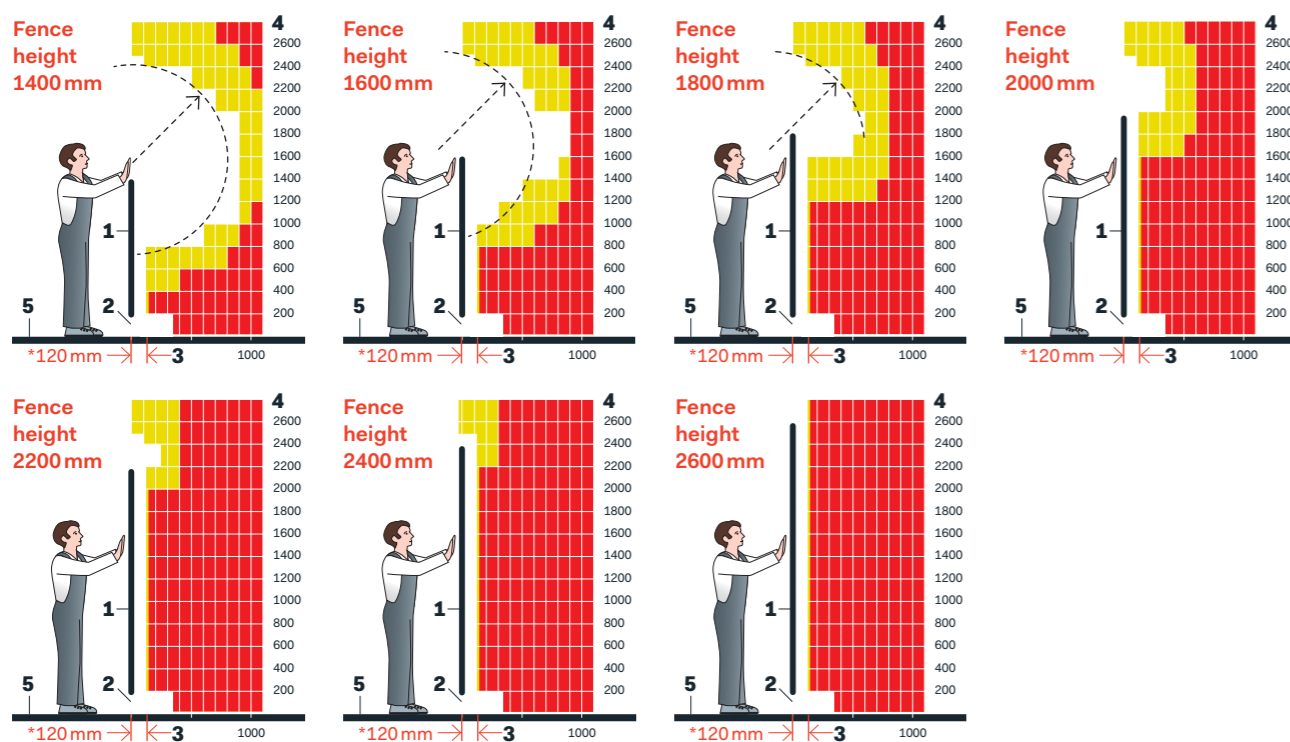
Protective fence system Frame with wave grid – opening 40×40 mm

*200 mm = distance to hazard zone of 200 mm required for openings of 40×40 mm



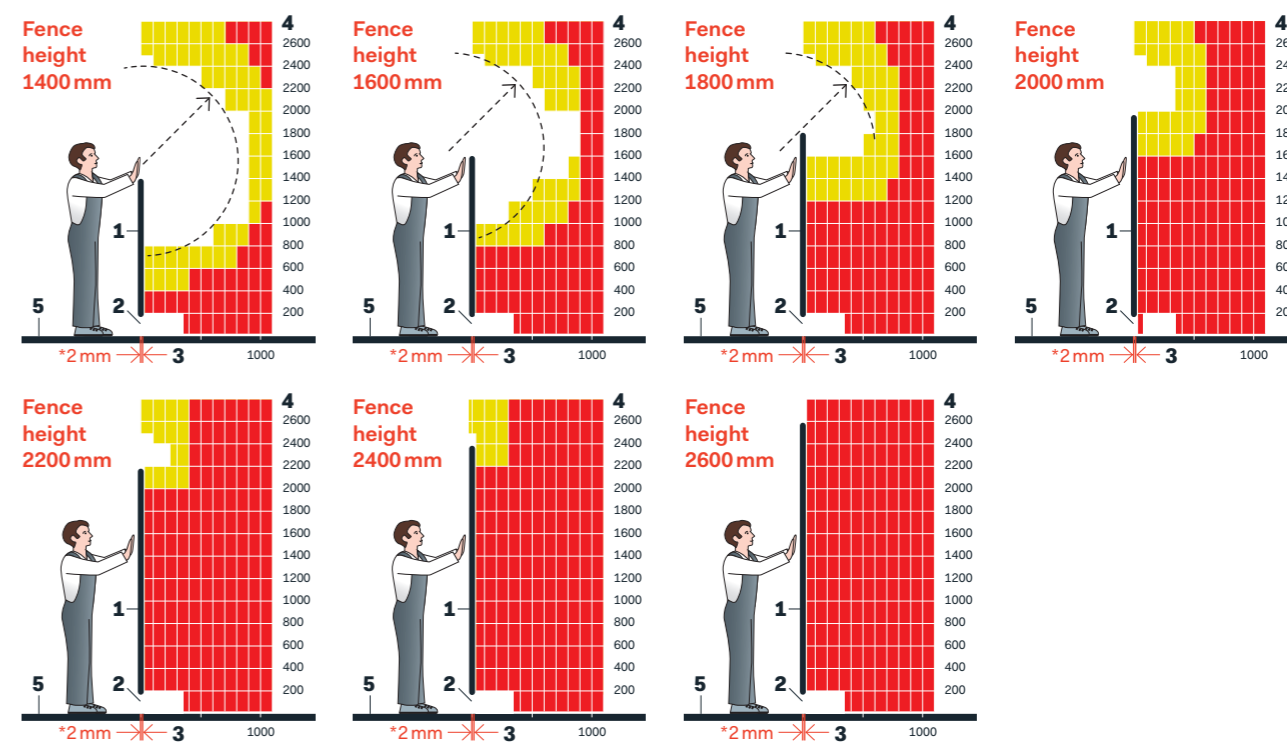
Protective fence system Flex – opening 20×200 mm
Protective fence system Frame with wave grid – opening 25×25 mm

*120 mm = distance to hazard zone of 120 mm required for openings of 20×200 mm and 25×25 mm



Protective fence system Wall – without opening

*2 mm = distance to hazard zone of 2 mm required for system without opening



/02.6 Safety Distances

Safety distances when reaching upwards

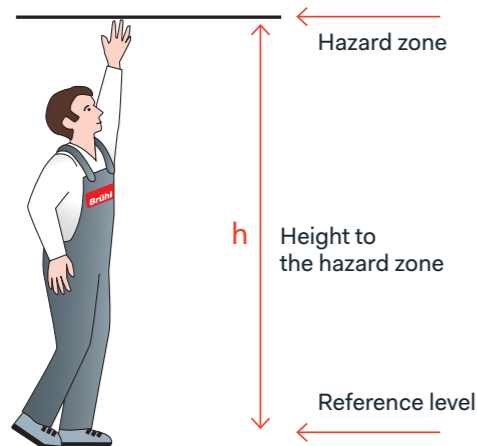
According to EN ISO 13857

Before determining safety distances that prevent persons from reaching hazard zones, it is necessary to decide whether values for high or low risk should be used. A risk assessment must therefore be carried out (see EN ISO 12100).

Low risks arise only from hazards such as friction or abrasion, where long-term or irreversible bodily harm is not foreseeable.

Low risk
 ≥ 2500 mm
 or other safety measures

High risk
 ≥ 2700 mm
 or other safety measures



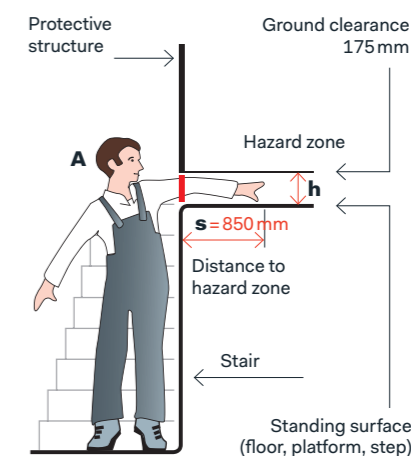
/02.7 Safety Distances

Safety distances when reaching around with restricted movement

According to EN ISO 13857, Table 3

In stair areas, the upper limbs may reach into the hazard zone. In such cases, an additional protective structure should be used or the ground clearance should be reduced to 20 mm.

- h** Ground clearance
 - s** Reach depth
 - A** Arm movement range
 - s_r** Radial safety distance
- * the diameter of a circular, the side of a square, or the width of a slot-shaped opening.



Supported arm area	Length of support	s _r radial safety distance
Arm and hand up to the base of the fingers 	720 mm	≥ 130 mm
Arm up to the wrist 	620 mm	≥ 230 mm
Arm up to the elbow 	300 mm	≥ 550 mm
Restriction of movement only at the shoulder and armpit 	0 mm	≥ 850 mm

/02.8 Safety Distances

Safety distances to prevent access to hazardous areas with the lower limbs

According to EN ISO 13857, Table 7

Derivation of ground clearance

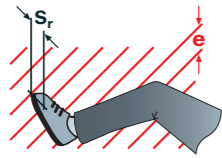
Slot-shaped openings with $e > 180$ mm and square or circular openings with $e > 24$ mm allow access of the entire body.

→ Brühl standard ground clearance: 175 mm

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 tip to knee".

3 The value refers to "toe tip to crotch".


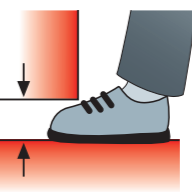

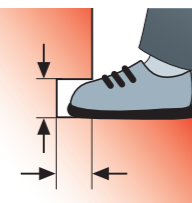
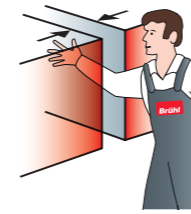
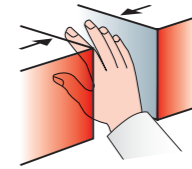
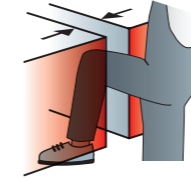
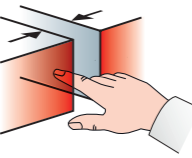
	Opening 2	Sr Safety distance	
		Slot	Square/Circle
Toe tip	 $e \leq 5$ mm	0 mm	0 mm
Toe	$5 < e \leq 15$ mm	≥ 10 mm	0 mm
	$15 < e \leq 35$ mm	≥ 80 mm 1	≥ 25 mm
Foot	$35 < e \leq 60$ mm	≥ 180 mm	≥ 80 mm
	$60 < e \leq 80$ mm	≥ 650 mm 2	≥ 180 mm
Leg (toe tip to knee)	$80 < e \leq 95$ mm	≥ 1100 mm 3	≥ 650 mm 2
	$95 < e \leq 180$ mm	$sr \geq 1100$ mm 3	$sr \geq 1100$ mm 3
Leg (toe tip to crotch)	$180 < e \leq 240$ mm	Nicht zulässig	$sr \geq 1100$ mm 3

/02.9 Safety Distances

Minimum distances to avoid crushing of body parts

According to EN 13854, Table 1

Moving hazardous parts must not be accessible and/or touchable. If danger points and sources cannot be eliminated by design measures, they must be equipped with protective devices. To ensure the safety of persons and their body parts, the specified safety distances must be maintained.

	Safety distance		Safety distance
Body	 ≥ 500 mm	Foot	 ≥ 120 mm
Head	 ≥ 300 mm	Toes	 ≥ 50 mm
Arm	 ≥ 120 mm	Fist, hand, wrist	 ≥ 100 mm
Leg	 ≥ 180 mm	Fingers	 ≥ 25 mm

/03

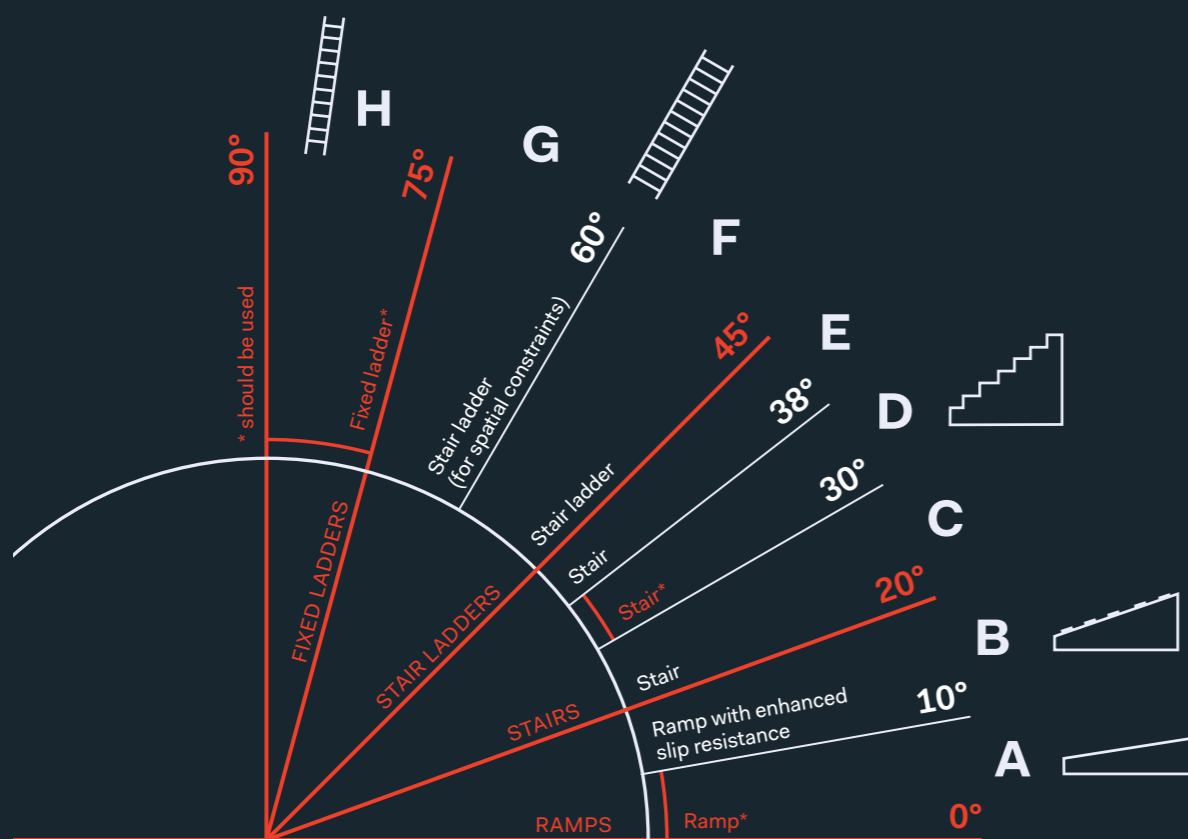
Safety of Machinery

Fixed access points

/03.1 Fixed access points

Use of various access types

According to ENISO 14122



/03.2 Fixed access points

Stairs and Stair Ladders

According to ENISO 14122

Use of guardrails on stairs

A staircase must have at least one handrail. If the stair width is 1200 mm or more, two handrails are required.

If the ascent height exceeds 500 mm and there is a lateral gap next to the stair stringer greater than 120 mm, a guardrail must be installed on that side as protection.

Use of guardrails on stair ladders

If the possible fall height exceeds 500 mm, a guardrail must be installed.

A guardrail is required if the distance between platform and machine or wall is greater than 120 mm, or if the protection provided by the machine is not equivalent to that of a guardrail. However, a toe board is always required if the gap between platform and adjacent supporting structure exceeds 20 mm.

Step dimension rule stair Fig.1

$$g + 2h = 630 \pm 30$$

1 In the case of a single stair flight, the stair height H may be increased to a maximum of 4000 mm.

2 The depth of a stair tread plus twice the riser height should total between 610 and 660 mm. The stride length of an average-sized person is 630 mm.

Definition of Stairs and Stair Ladders

Fig.2	Description	Dimensions
t	Tread	$t \geq 80 \text{ mm}$
h	Riser	$h \leq 250 \text{ mm}$
g	Tread width	$600 \leq g + 2h \leq 660 \text{ mm}$
r	Undercut	Stairs: $> 10 \text{ mm}$ Stair ladders: $r > 0 \text{ mm}$
w	Stair width	Stairs: $600 \leq w \leq 1200 \text{ mm}$ Stair ladders: $500 \leq w \leq 800 \text{ mm}$
e	Clear headroom	$e \geq 2300 \text{ mm}$
c	Clearance	$c \geq 850 \text{ mm}$
H	Stair height	$H \leq 3000 \text{ mm} (\leq 4000 \text{ mm})$ 1

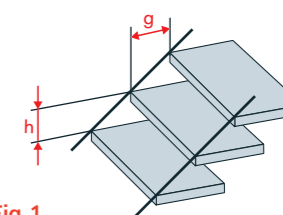


Fig.1

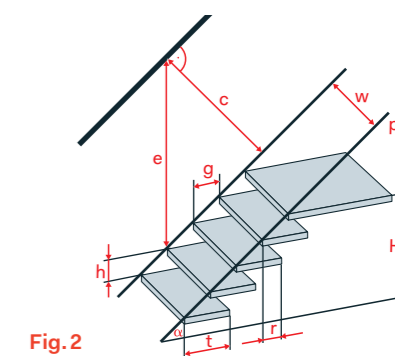


Fig.2

Safety requirements for guardrails on stairs and stair ladders

According to ENISO 14122-3:2001

Fig.3	Description	Dimensions
a	Height of handrail above exit level	≥ 1100 mm
b	Height of toe board above walking level	≥ 100 mm
c	Vertical height of the handrail	900–1000 mm
d	Distance toe board – knee rail and knee rail – handrail	≤ 500 mm
e	Handrail diameter	Ø 25–50 mm
f	Stair height	f ≤ 3000 mm (≤ 4000 mm) 1
g	Clear headroom	≥ 2300 mm

1 In the case of a single stair flight, the stair height H may be increased to a maximum of 4000 mm.

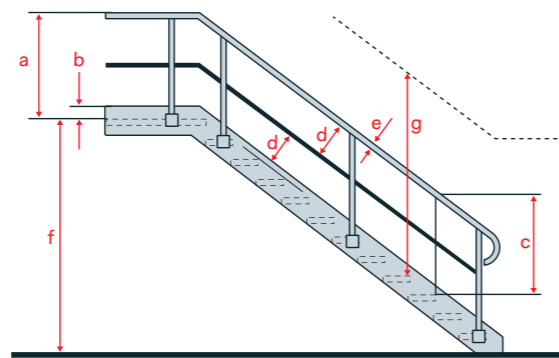


Fig.3

Position of the handrail on a stair ladder

According to ENISO 14122-3:2001

Fig.4 Examples of distances from the pitch line to the axis of the handrail on a stair ladder

θ Grad	x
60°	250 mm
65°	200 mm
70°	150 mm
75°	100 mm

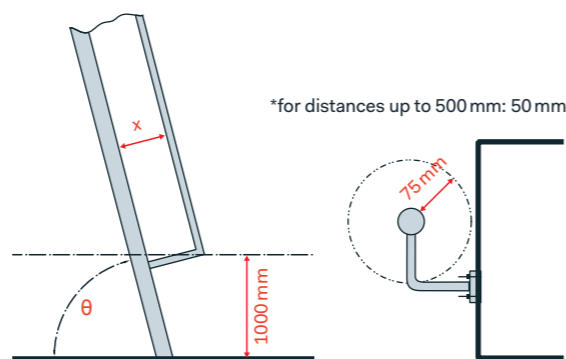


Fig.4

Fig.5

Fig.5 Clearance at the handrail

≥ 100 mm

Safety requirements for guardrails

According to ENISO 14122-3:2016, 7.1.6

Fig.6	Description	Dimensions
a	Height of handrail above walking level	≥ 1100 mm
b	Height of toe board above walking level	≥ 100 mm
c	Distance toe board – walking level	≤ 12 mm
d	Distance toe board – knee rail and knee rail – handrail	≤ 500 mm
e	Distance between sections - for square guardrails - for rounded guardrails	50–120 mm / 50–80 mm

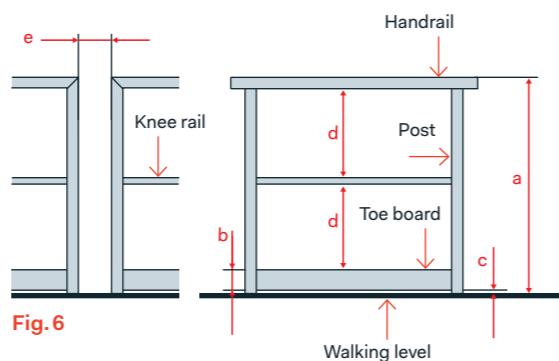


Fig.6

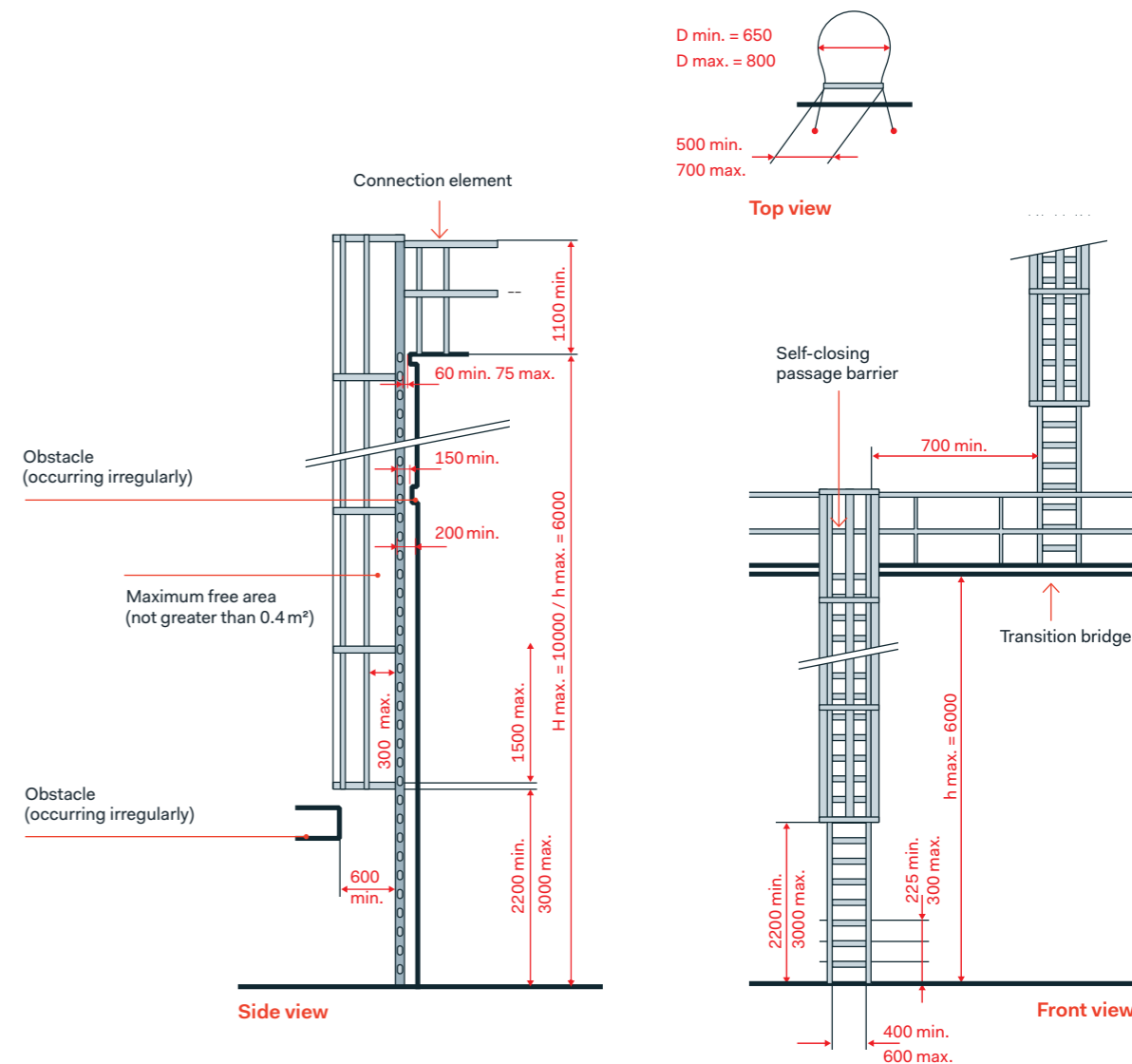
/03.3 Fixed access points

Safety requirements for fixed ladders with back protection hoop

According to ENISO 14122

The climbing height h must not exceed 6000 mm. In the case of a single ladder flight (no resting platform), the height h between the entry and exit surfaces may be extended but must not exceed H=10,000 mm. The rungs must have a slip-resistant tread surface.

All dimensions in mm.



Top view

Side view

Front view

Safety of Machinery

Brühl Safety Distance Configurator

Also available
as a free app



The Brühl Safety Distance Configurator is intended for anyone dealing with safety distances involving separating protective devices. It provides practical support for risk and hazard assessment directly in the production environment. Using the Brühl app, protective devices can be directly planned and installed with the correct safety distance, and on-site verification can be carried out. Users can choose between the desktop version, the mobile web version, or the app version.

Available on the
App Store

ANDROID APP ON
Google play

The logo for Brühl, featuring the word "Brühl" in white, bold, sans-serif font inside a red rounded rectangle.

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