

The TROAX logo is located in the top right corner of the page. It consists of the word "TROAX" in a bold, italicized, sans-serif font, with a registered trademark symbol (®) to its upper right. The text is positioned between two horizontal white bars that extend across the width of the logo area.

TROAX

The background of the entire page is a photograph of an industrial setting. A large, grey metal safety cage with a grid pattern is the central focus. Inside the cage, a blue robotic arm is visible, positioned over a silver metal chassis of a vehicle. The scene is set in a factory or workshop with concrete floors and grey walls.

SAFETY GUIDE

**ISO 13857 – SAFETY DISTANCE
FOR MACHINE GUARDS**

PROTECTING PEOPLE, PROPERTY, AND PROCESSES.

REACHING OVER PROTECTIVE STRUCTURES

Height of hazard zone, a	Height of protective structure, b				
	1,000	1,200	1,400	1,600	1,800
	Horizontal safety distance to hazard zone, c				
2,700	0	0	0	0	0
2,600	900	800	700	600	600
2,400	1,100	1,000	900	800	700
2,200	1,300	1,200	1,000	900	800
2,000	1,400	1,300	1,100	900	800
1,800	1,500	1,400	1,100	900	800
1,600	1,500	1,400	1,100	900	800
1,600	1,500	1,400	1,100	900	800
1,400	1,500	1,400	1,100	900	800
1,200	1,500	1,400	1,100	900	700
1,000	1,500	1,400	1,000	800	0
800	1,500	1,300	900	600	0
600	1,400	1,300	800	0	0
400	1,400	1,200	400	0	0
200	1,200	900	0	0	0

Protective structures lower than 1,400 mm should not be used without additional safety measures.

REACHING AROUND WITH LIMITATION OF MOVEMENT

TABLE 3 – SHOWS EXAMPLES OF
FUNDAMENTAL MOVEMENTS COVERING
PEOPLE OF 14 YEARS AND OLDER.
DIMENSION IN MILLIMETERS.

Limitation of movement	Safety distance, S_r	Illustration
Limitation of movement only at shoulder and armpit	≥ 850	
Arm supported up to elbow	≥ 550	
Arm supported out to wrist	≥ 230	
Arm and hand supported up to knuckle joint	≥ 130	

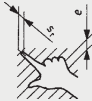


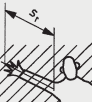
A = The range of movement of the arm
 S_r = The radial safety distance

a = This is either the diameter of a round opening,
 or the side of a square opening, or the width of a slot opening.

**SAFETY IS
ABOUT
BEING ONE
STEP AHEAD**

REACHING THROUGH REGULAR OPENINGS

TABLE 4 – THE VALUES IN THE TABLE BELOW APPLY SOLELY TO PERSONS AGED 14 YEARS AND OVER. DIMENSION IN MILLIMETERS.





Part of body	Illustration	Opening	Safety distance, S_r		
			Slot	Square	Round
Fingertip		$e \leq 4$	≥ 2	≥ 2	≥ 2
		$4 < e \leq 6$	≥ 10	≥ 5	≥ 5
Finger up to knuckle joint		$6 < e \leq 8$	≥ 20	≥ 15	≥ 5
		$8 < e \leq 10$	≥ 80	≥ 25	≥ 20
		$10 < e \leq 12$	≥ 100	≥ 80	≥ 80
or hand		$12 < e \leq 20$	≥ 120	≥ 120	≥ 120
		$20 < e \leq 30$	$\geq 850^{1)}$	≥ 120	≥ 120
Arm up to junction with shoulder		$30 < e \leq 40$	≥ 850	≥ 200	≥ 120
		$40 < e \leq 120$	≥ 850	≥ 850	≥ 850

The colour markings indicate which body parts are limited by size for each opening.

1) If the length of the slot opening is ≤ 65 mm, the thumb will act as a stop and the safety distance can be reduced to 200 mm.

DISTANCE TO IMPEDE FREE ACCESS BY LOWER LIMBS

TABLE 7 – THE VALUES IN THE TABLE BELOW ARE INDEPENDENT OF WHETHER CLOTHES OR FOOTWEAR IS BEING WORN AND ARE APPLICABLE FOR PERSONS OF 14 YEARS OF AGE AND ABOVE. DIMENSION IN MILLIMETERS.

Part of lower limb	Illustration	Opening	Safety distance, S_r	
			Slot	Square or round
Toe tip		$e \leq 5$	0	0
		$5 < e \leq 15$	≥ 10	0
Toe		$15 < e \leq 35$	≥ 80	≥ 25
Foot		$35 < e \leq 60$	≥ 180	≥ 80
		$60 < e \leq 80$	≥ 650	≥ 180
Leg (toe tip to knee)		$80 < e \leq 95$	$\geq 1,100$	≥ 650
		$95 < e \leq 180$	$\geq 1,100$	$\geq 1,100$
Leg (toe tip to crotch)		$180 < e \leq 240$	Not applicable	$\geq 1,100$

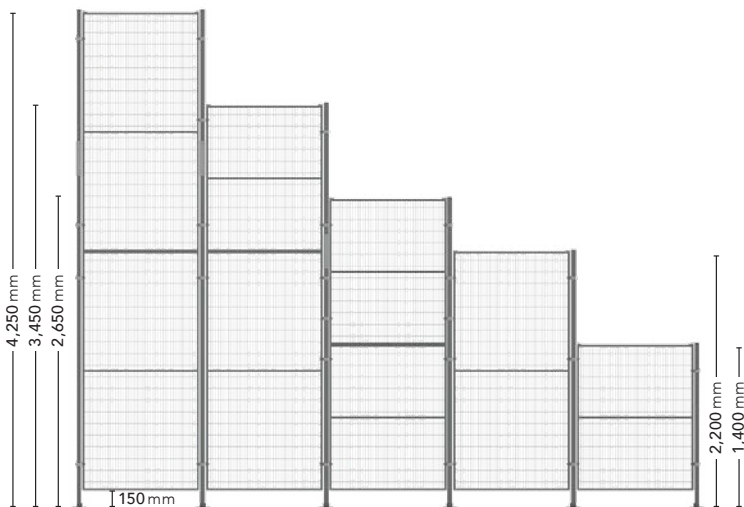
The colour markings indicate which body parts are limited by size for each opening. If the length of a slot opening is ≤ 75 mm, the safety distance can be reduced to ≥ 50 mm.

Slot openings $e > 180$ mm, square and round openings $e > 240$ mm permit full body access.

Additional safety measures must be taken.

MAXIMUM FLOOR SWEEP

CONSIDERATION OF WHOLE BODY ACCESS IS NOW DEFINED IN ISO **13857:2019, 4.4**. IT DESCRIBES THAT THE GAP BETWEEN THE FLOOR AND THE MACHINE GUARD SHALL NOT EXCEED **180 MM**.



SELECTION OF SAFEGUARDING

The basis for choosing safety measures must always be a risk assessment. For example, if there is a foreseeable risk of ejections of parts from the machine, the guard shall be designed and constructed so as to contain and withstand such impacts. Read more about the requirements for designing guards in ISO 14120.



MAKING YOUR WORLD SAFE



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