

The logo for TROAX, featuring the word "TROAX" in a bold, italicized, sans-serif font, positioned between two horizontal white bars.

**TROAX**

# 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	$\geq 850$	
Arm supported up to elbow	$\geq 550$	
Arm supported out to wrist	$\geq 230$	
Arm and hand supported up to knuckle joint	$\geq 130$	

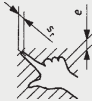


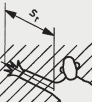
A = The range of movement of the arm  
 $S_r$  = The radial safety distance

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		$e \leq 4$	$\geq 2$	$\geq 2$	$\geq 2$
		$4 < e \leq 6$	$\geq 10$	$\geq 5$	$\geq 5$
Finger up to knuckle joint		$6 < e \leq 8$	$\geq 20$	$\geq 15$	$\geq 5$
		$8 < e \leq 10$	$\geq 80$	$\geq 25$	$\geq 20$
		$10 < e \leq 12$	$\geq 100$	$\geq 80$	$\geq 80$
or hand		$12 < e \leq 20$	$\geq 120$	$\geq 120$	$\geq 120$
		$20 < e \leq 30$	$\geq 850^{1)}$	$\geq 120$	$\geq 120$
Arm up to junction with shoulder		$30 < e \leq 40$	$\geq 850$	$\geq 200$	$\geq 120$
		$40 < e \leq 120$	$\geq 850$	$\geq 850$	$\geq 850$

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

1) If the length of the slot opening is  $\leq 65$  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
		$5 < e \leq 15$	$\geq 10$	0
Toe		$15 < e \leq 35$	$\geq 80$	$\geq 25$
Foot		$35 < e \leq 60$	$\geq 180$	$\geq 80$
		$60 < e \leq 80$	$\geq 650$	$\geq 180$
Leg (toe tip to knee)		$80 < e \leq 95$	$\geq 1,100$	$\geq 650$
		$95 < e \leq 180$	$\geq 1,100$	$\geq 1,100$
Leg (toe tip to crotch)		$180 < e \leq 240$	Not applicable	$\geq 1,100$

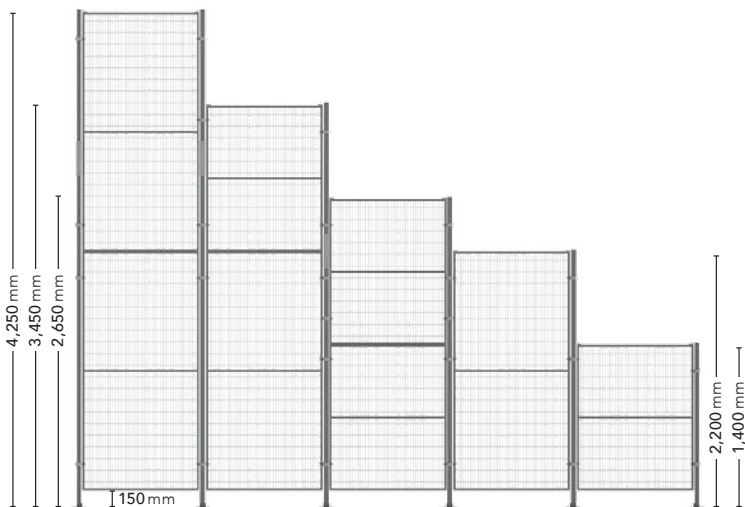
The colour markings indicate which body parts are limited by size for each opening. If the length of a slot opening is  $\leq 75$  mm, the safety distance can be reduced to  $\geq 50$  mm.

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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