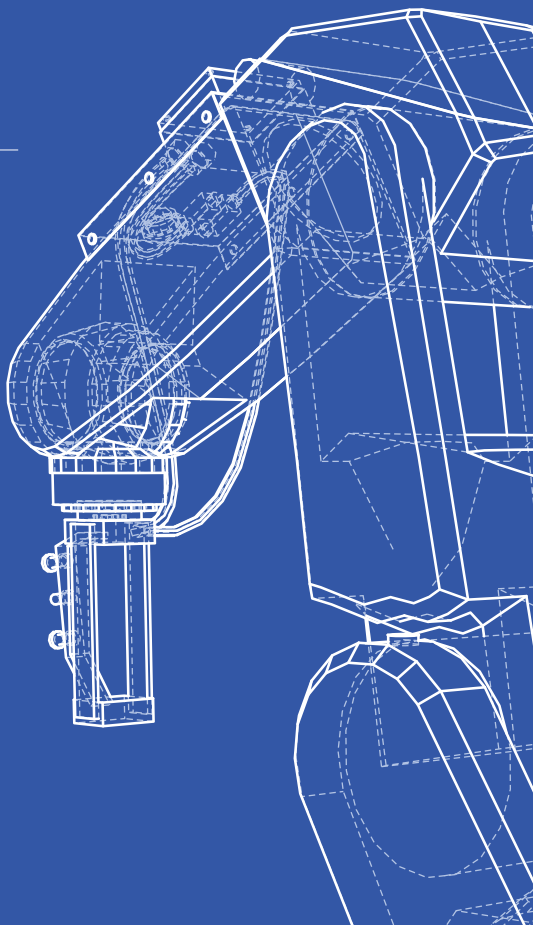
CENHEARD®

Machinery Safety - Reach Distances

In accordance with type-B1 standard - BS EN ISO 13857

The following references do not apply if there is a type C standard for the chosen application; the specifications of C-type standards take precedence over A or B type standards.



@cenheard

for more info visit **cenheard.com**

Definitions

Protective structure - safeguard or other physical obstruction which restricts the movement of the body and/or part of it in order to prevent reaching hazard zones.

Reference plane - level at which persons would normally stand during the use of the machine or access to the hazard zone.

Safety distance - minimum distance a protective structure is required to be placed from a hazard zone.

Reaching over protective structures - Only minor injuries along with a low probability of occurrence

Height of hazard zone nearest to the upper limb reach (mm)	Height of protective structure (mm)[X]								
	1000	1200	1400	1600	1800	2000	2200	2400	2500
	Horizontal safety distance to hazard zone nearest to the upper limb reach (mm)								
2500	0	0	0	0	0	0	0	0	0
2400	100	100	100	100	100	100	100	100	0
2200	600	600	500	500	400	350	250	0	0
2000	1100	900	700	600	500	350	0	0	0
1800	1100	1000	900	900	600	0	0	0	0
1600	1300	1000	900	900	500	0	0	0	0
1400	1300	1000	900	800	100	0	0	0	0
1200	1400	1000	900	500	0	0	0	0	0
1000	1400	1000	900	300	0	0	0	0	0
800	1300	900	600	0	0	0	0	0	0
600	1200	500	0	0	0	0	0	0	0
400	1200	300	0	0	0	0	0	0	0
200	1100	200	0	0	0	0	0	0	0
0	1100	200	0	0	0	0	0	0	0

X - Protective structures less than 1000 mm in height are not included because they do not sufficiently restrict movement of the body.

Reaching over protective structures

Height of hazard zone nearest to the upper limb reach (mm)[X]	Height of protective structure (mm)[Y, Z]									
	1000	1200	1400	1600	1800	2000	2200	2400	2500	2700
	Horizontal safety distance to hazard zone nearest to the upper limb reach (mm)									
2700	0	0	0	0	0	0	0	0	0	0
2600	900	800	700	600	600	500	400	300	100	0
2400	1100	1000	900	800	700	600	400	300	100	0
2200	1300	1200	1000	900	800	600	400	300	0	0
2000	1400	1300	1100	900	800	600	400	0	0	0
1800	1500	1400	1100	900	800	600	0	0	0	0
1600	1500	1400	1100	900	800	500	0	0	0	0
1400	1500	1400	1100	900	800	0	0	0	0	0
1200	1500	1400	1100	900	700	0	0	0	0	0
1000	1500	1400	1000	800	0	0	0	0	0	0
800	1500	1300	900	600	0	0	0	0	0	0
600	1400	1300	800	0	0	0	0	0	0	0
400	1400	1200	400	0	0	0	0	0	0	0
200	1200	900	0	0	0	0	0	0	0	0
0	1100	500	0	0	0	0	0	0	0	0

X - For hazard zone above 2700mm, refer to 4.2.1 in BS 13857:2019

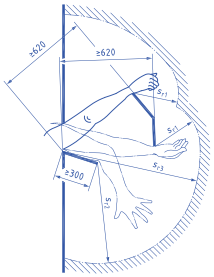
Y - Protective structures less than 1000 mm in height are not included because they do not sufficiently restrict movement of the body.

Z - Protective structures lower than 1400 mm should not be used without additional protective measures.

Reaching around with additional protective structures

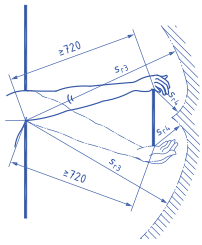
Limitation of movement at shoulder and armpit: two separate protective structures — one permits movement from the wrist, the other movement from the elbow.

$s_{r1} \geq 230$
$s_{r2} \geq 550$
$s_{r3} \geq 850$



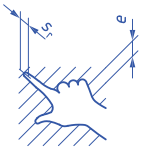
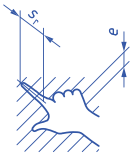
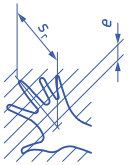
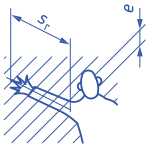
Limitation of movement at shoulder and armpit: one separate protective structure, which permits movement from the fingers up to the knuckle joint.

$s_{r3} \geq 850$
$s_{r4} \geq 130$



s_r - Radial safety distance

Reaching through regular openings — Persons of 14 years of age and above

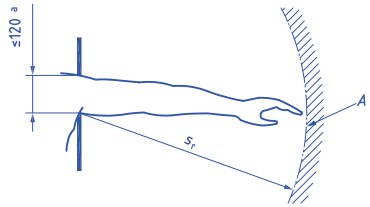
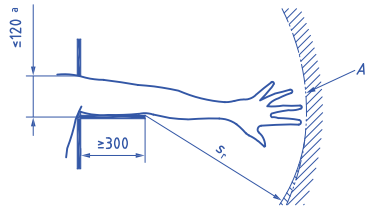
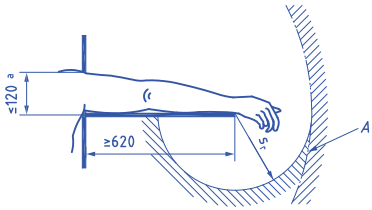
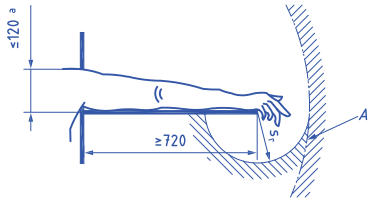
Part of body	Illustration	Opening	Safety distance to hazard zone (mm), s_r		
			Slot	Square	Round
Fingertip		e ≤ 4	≥2	≥2	≥2
		4 < e ≤ 6	≥10	≥5	≥5
Finger up to knuckle joint		6 < e ≤ 8	≥20	≥15	≥5
		8 < e ≤ 10	≥80	≥25	≥20
Hand		10 < e ≤ 12	≥100	≥80	≥80
		12 < e ≤ 20	≥120	≥120	≥120
		20 < e ≤ 30	≥850[x]	≥120	≥120
Arm up to junction with shoulder		30 < e ≤ 40	≥850	≥200	≥120
		40 < e ≤ 120	≥850	≥850	≥850

The bold lines within the table delineate that part of the body restricted by the opening size.
x - If the length of the slot opening is ≤65 mm, the thumb will act as a stop and the safety distance may be reduced to ≥200mm.

Whole body access

Protective structures with a slot opening greater than 180mm and square or round opening greater than 240mm shall not be used without additional protective measures as they can allow whole body access.

Reaching around with limitation of movement

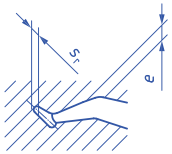
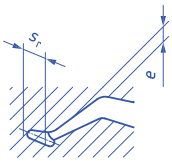
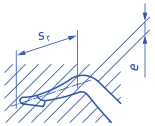
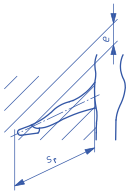
Limitation of movement	Safety distance to hazard zone, s_r	Illustration
Only at shoulder and armpit	≥850	
Arm supported up to elbow	≥550	
Arm supported up to wrist	≥230	
Arm and hand supported up to knuckle joint	≥130	

A - Range of movement of upper limb

s_r - Radial safety distance

a - This is either the diameter of a round opening, or the side of a square opening, or the narrowest dimension of the slot opening.

Reaching through openings of regular shape by lower limbs

Part of body	Illustration	Opening	Safety distance to hazard zone (mm), s_r	
			Slot	Square or Round
Toe tip		e ≤ 5	0	0
		5 < e ≤ 15	≥10	0
Toe		15 < e ≤ 35	≥80[X]	≥25
Foot		35 < e ≤ 60	≥180	≥80
		60 < e ≤ 80	≥650[Y]	≥180
Leg (toe tip to knee)		80 < e ≤ 95	≥1100[Z]	≥650[Y]
Leg (toe tip to crotch)		95 < e ≤ 180	≥1100[Z]	≥1100[Z]
		180 < e ≤ 240	Not admissible	≥1100[Z]

X - If the length of the slot opening is ≤75 mm, the distance may be reduced to ≥50 mm.
Y - The value corresponds to leg (toe tip to knee).
Z - The value corresponds to leg (toe tip to crotch).
Note - Slot openings with e > 180 mm and square or round openings with e > 240 mm will allow access for the whole body.

Cenheard Limited,
8 York Place,
Knaresborough,
HG5 0AA
Telephone: (+44) (0) 1423 642774
E-mail: support@cenheard.com