

Notes on Risk Assessment for existing Hand-Fed Platen Presses - Appendix

Extract from IEC TS 62046 “Safety of Machinery – application of presence sensing protective equipment to machinery (ESPE)”

Distance To A Hazard

Where ESPE is used, it shall be positioned at a sufficient distance from the machine hazards to ensure the machine can stop or otherwise reach a safe condition before any part of an approaching person can reach the hazardous zone. The separation distance shall be maintained for all foreseeable directions of approach.

This distance shall take into account:

a) ESPE detection capability in relation to human characteristics including:

- Approach speed;
- Body part penetration/encroachment;
- Possibility of circumvention, and

b) the overall system stopping performance;

In the case of moving parts of machines the separation distance used shall apply from the moving part towards the direction of approach. The minimum distance of the trip device from the machine hazard (danger zone) shall be calculated by using the general formula below, which is taken from ISO 13855/EN 999:

$$S = (K \times T) + C$$

Where:

S is the minimum distance, in millimeters, from the machine hazard (danger zone) to the detection point, line, plane or zone;

K is a parameter, having the following values K: walking speed; 1600 mm/sec, upper limbs; 2000 mm/sec.

T is the overall system stopping performance in seconds;

C is an additional distance, in millimeters, having the following values:

Upper limbs; $C = 8(d - 14)$ where d is the detection capability and is ≤ 40 mm
 $C = 850$ when the detection capability is > 40 mm

Lower limbs; $C = 1200 - 0.4 * H$ where H is the height of the detection zone
 $H \leq 15 (d - 50)$ where d is the detection capability

Whole body; $C = 1200$ when the protective equipment is at floor level

$C = 1200 - 0.4 * H$ where H is the height of the detection zone at the point furthest from the hazard

(The value of 1200mm used for C when considering ground-level trip devices includes an allowance for the first stride of a person stepping into the sensing zone of the trip device.)

Stopping Performance

The overall system stopping performance used for calculation of the separation distance shall include:

- a) the response time of the protective equipment;
- b) the maximum time under worst-case conditions, for example maximum load, maximum speed, etc. for the machine to stop or otherwise reach a safe condition after receiving the output signal from the protective equipment;
- c) factors which can lead to a deterioration in performance of pneumatic, electrical and mechanical components, for example wear, Ageing, temperature;
- d) an allowance for the accumulation of such factors as variations in stopping performance, installation tolerances, time measurement accuracy, etc.

(The total allowance for deterioration in performance and variation in stopping performance, etc. under c) and d), should be a minimum of 10%.)

Supplementary Protective Measures

Supplementary protective measures shall be provided as necessary to ensure that:

- the hazardous zone of the machine can be approached only through the detection zone of the trip device;
- unexpected start-up of the machine is not possible after a person has passed through the detection zone of the trip device to the hazardous zone of the machine.

These supplementary protective measures can include, for example:

- barriers to ensure that a person cannot approach the machine hazard from directions not protected by the protective equipment
- provision of a restart interlock
- provision of a presence sensing device;
- measures to prevent a person being present between the protective equipment and the hazardous zone,

If additional measures (e.g. obstacles) are used to prevent a person being present between the ESPE and the hazardous zone, and the additional means is designed to be removed, it shall be interlocked with the safety-related control system so that hazardous machine movement is not possible if the additional means is not present.

It shall not be possible to create an additional hazardous situation after any person has passed through the detection zone of an ESPE.