

General calculation formula
given in pr EN 999

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

where

- S** is the minimum distance in mm from the hazardous zone to the detection point, plane or zone;
- K** is a parameter in mm per second, derived from data on approach speeds of the body or parts of the body;
- T** is the overall stopping performance in seconds;
- C** is the additional distance in mm, based on intrusion towards the danger zone prior to actuation of the protective equipment.

II.3.4 Calculating the safety distance

The calculation of the safety distance for an AOPD is described in standard pr EN 999. If the machine comes under a specific standard (e.g. cold metal presses) or particular technical specifications (renewal of cold metal presses), these must be referred to.

Any AOPD shall be installed in such a way that access to the hazardous zone without detection by the device is impossible. Furthermore, it shall not be possible for a person to be present within the hazardous zone without being detected.

If the minimum distance calculated is acceptable from an operational, industrial and ergonomic point of view, one must nevertheless determine whether the installation and the configuration of the safety device is such that personnel can be present within the detection zone of the device and the hazardous zone without being detected.

If this is the case, the installation must be equipped with additional safety features (themselves monitored in situ if necessary).

If the minimum distance is too great and is not acceptable from an ergonomic point of view, one must determine whether it is possible either to reduce the overall response time of the machine or to improve the resolution of the protective device.

For example: With a perpendicular approach and an overall response time of 100 ms, the calculated distance will be equal to 368 mm for an AOPD with resolution of 35 mm, whereas with a

resolution of 14 mm the calculated distance will be 200 mm.

For presses according to standards EN 692 and pr EN 693 the following table has to be used:

With regard to the detection capability of the AOPD, the additional distance C in the following table shall at least be used when calculating the minimum distance S (table taken from EN 692).

Detection capability mm	Additional distance C mm	Cycle initiation by the AOPD
≤ 14	0	Allowed
> 14 ≤ 20	80	
> 20 ≤ 30	130	
> 30 ≤ 40	240	Not allowed
> 40	850	