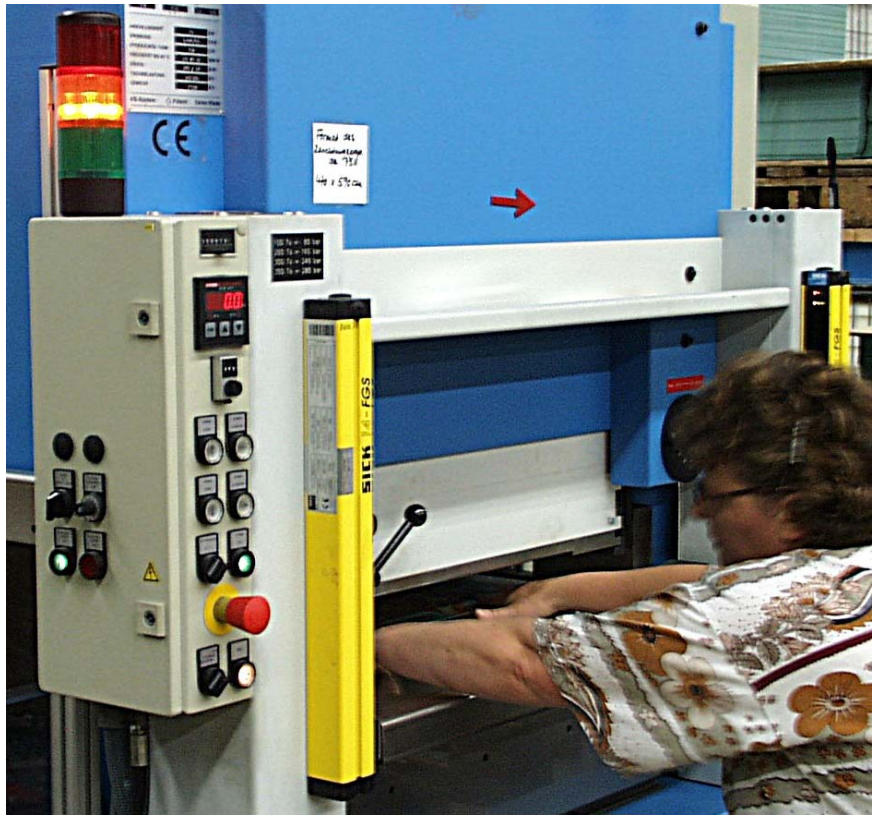
issa | INTERNATIONALE VEREINIGUNG FÜR SOZIALE SICHERHEIT | IVSS
Sektion für Maschinen- und Systemsicherheit

Light curtains / light grids

Areas of application

Finger and hand protection or danger zone guarding on machines, such as presses, automatic placement machines, wood, printing and paper processing machines or machines for storage and conveyor technology.



Protection of a punching machine by a light curtain

Formula for calculating the required safety distance: S = (K x T) + C

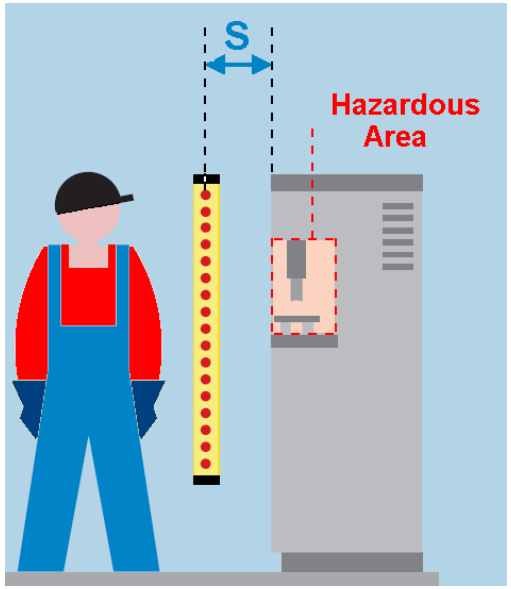
S: Minimum distance between the beginning of the danger zone and the protective field in mm, but may not exceed not fall below 100 mm

K: Approach speed of the body or of body parts in mm/s

T: Total reaction time of protective device and Machine Control including overtravel in s

C: Additional distance in mm which prevents penetration into the danger zone before the protective device is triggered

Note: For details see ISO 13855



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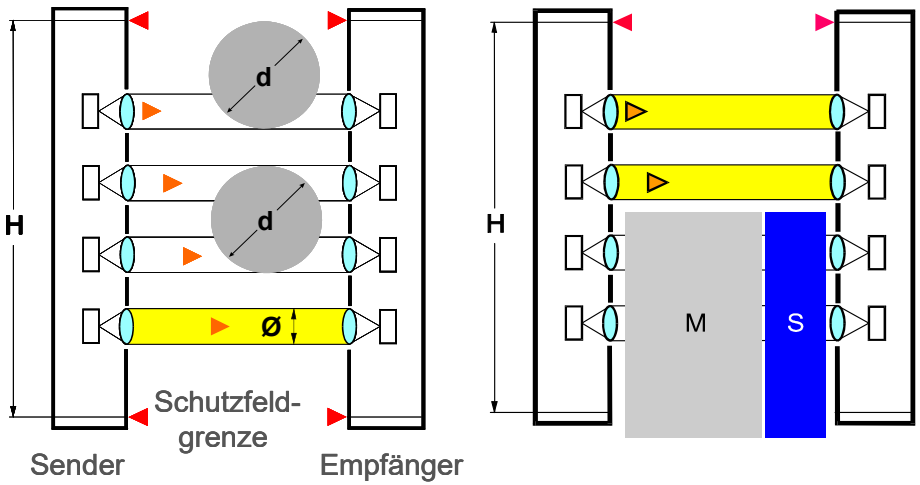
a) Representation of the light grid principle b) Blanking



Φ: effective diameter of the light beamd:
Test rod diameter
H: Protective field height
M: Machine part permanently fixed
S: Additional mechanical protection

A light curtain or light grid consists of an emitter and a receiver with the protective field in between, limited in height and width. Depending on the part of the body to be protected, the physical resolution must be, for example, 14 mm for finger protection or 20 mm for hand protection.
IEC 61496-1/-2 defines such protective devices as type 2 and type 4, and optional functions such as contactor monitoring, start/restart interlock, blanking and the bridging of safety circuits (muting) can also be implemented in the light curtain. According to the results of a risk assessment of the machine in accordance with DIN EN 12100, the light curtain must be designed as type 2 or 4 and electrically integrated into the machine control system.

Example for blanked light beams (Blanking)

A machine part protrudes permanently into the protective field of the light grid.The contiguously interrupted individual beams are bridged internally in the light grid; lateral access to the danger point, past the machine part, is prevented by a fixed mechanical guard. The permanent dark state of the interrupted light beams is monitored in the light grid. A light beam that is released again causes the dangerous machine movement to stop.)

Testing the function on the machine

- Is the associated test specimen detected in the protective field at any point and at any angle?
- Is bypassing the protective field prevented by stepping over, under, around or behind it?
- Reflective surfaces and devices of the same type are located in sufficient distance to the protective field?
- Is the danger zone from the point of command to the first
- Can you see when the machine starts up?Is the safety distance to the danger point sufficient, even for the greatest possible overrun?
- The protective device does not cause any faults in the work process - an incentive for manipulation is not recognizable?
- For example, the electrical integration into the machine control corresponds to the required category or performance level according to ISO 13849-1?
- Is an EC declaration of conformity from the manufacturer of the protective device or an EC type-examination certificate from a notified body?