

V. Glossary of Selected Light Curtain Terminology

AOPD:

“AOPD” is the abbreviation for Active Optoelectronic Protective Device... such as a light curtain, light grid, and single light beam.

Alignment:

Positioning of a light curtain beam so that the maximum amount of emitted light energy reaches the receiver element.

Alignment Aid:

Typically a built-in light curtain feature that facilitates alignment of the emitter (transmitter) and receiver during installation. For long-range sensing, or when using deflecting mirrors, an external alignment aid (such as a laser aligning tool) may be used during installation.

Ambient Conditions:

The environmental conditions in the area in which the light curtain is installed (e.g. humidity, temperature, light level, etc.).

Angle of Acceptance:

The included angle of the field of view within which the receiver will respond to the emitter’s (transmitter’s) transmitted light energy.

Angle of Divergence:

The included angle of the field of light energy transmitted by the emitter element of the light curtain.

Attenuation:

A reduction in the energy level of the emitted light caused by environmental elements such as dirt, moisture, or other contaminants in the ambient.

Beam Spacing:

The distance between the centerline of each of the beams of light energy transmitted by the emitter.

BG:

“BG” is the abbreviation for “Berufgenossenschaft”... an independent German insurance agency whose legislative arm recommends industry safety practices. The BG is one of many independent, recognized test agencies (also known in Europe as “notified bodies”) authorized to certify that safety products comply with all relevant standards.

Blanking (Fixed Blanking):

“Fixed Blanking” is when a fixed set of adjacent light beams are rendered permanently inactive for the purpose of allowing product or part of the process to enter the sensing area without deactivating the light curtain safety outputs. An example would be the “blanking” of a small segment of the light curtain to allow finished parts to eject from a machining operation through this specific “opening” in the protected field.

Blanking (Floating Blanking):

“Floating blanking” is when a set number (one or more) of adjacent beams is allowed to ignore the presence of an object within their portion of the protection field. However, unlike fixed blanking (where the inactive beams are fixed), “floating blanking” allows the set number of adjacent beams to “float” within protected field ... thus allowing the object to be ignored to move within the protected field without deactivating the light curtain safety outputs.

As long as no more than the selected number of adjacent beams is interrupted, the system remains operational and does not initiate stoppage of the machine. If one or more additional beams are interrupted, the light curtain system will initiate machine stoppage. An example would be similar to the ejected parts example above, but where the parts eject through a “moving opening”... that is, at different points through the protected field.

“CE” Mark:

The “CE” mark (for Conformance Europeene) is a symbol applied to finished products (including components such as light curtains, safety mats, safety interlock switches, safety controllers and machinery) which meet all applicable European Directives.

CSA:

Abbreviation for Canadian Standards Association. An independent testing agency similar to Underwriters Laboratories, Inc. (UL) in the United States. A product that is “CSA certified” has been type-tested and approved by the Canadian Standards Association as meeting relevant electrical and safety codes.

Emitter (photoelectric):

The light generating member of a light curtain pair. Also called the “transmitter”.

IEC:

The International Electrotechnical Commission, headquartered in Europe. This organization writes and distributes recommended safety and product performance standards for electrical products and components ... many of which become reference models for U.S. standards.

IP Rating:

A rating system established by the IEC. The “IP” rating defines the environmental suitability of light curtains and other component/system enclosures for various ambient conditions. Similar to NEMA ratings for electrical enclosures.

LED (Light Emitting Diode):

A semiconductor that emits a small amount of light energy when current flows through it in the forward direction.

Light Curtain (light screen):

An array of photoelectric sensing beams configured to sense objects present in their sensing area. "Safety light curtains" are used to detect personnel who enter into an unsafe area around or within a machine or work cell.

Minimum Object Sensitivity:

Minimum object sensitivity refers to the smallest object (diameter) that the light curtain can detect. It is commonly stated as the "resolution" of the light curtain, and is also called the detection capability.

MPCE:

"MPCE" is an abbreviation for Machine Primary Control Element. An MPCE is the final device controlling the power to a machine (e.g. a control relay or motor contactor).

MSCE:

"MSCE" is the abbreviation for Machine Secondary Control Element. An MSCE is a control element other than the MPCE capable of removing power from a machine (e.g. a safety controller, safety PLC).

Modulation (photoelectric):

Modulation of a light source refers to the repeated turning of it "on" and "off" at a high frequency (typically several kilohertz). The secret of a modulated photoelectric sensor's superior performance is that the emitter and receiver are tuned to the frequency of modulation. Only the modulated light is amplified, with all other light reaching the receiver ignored.

Muting:

"Muting" is the provisional and automatic overriding of the light curtain safety output function during normal, uninterrupted machine cycle operation. This is an important function in applications in which the light curtain or light grid must be interrupted by some part of the machine or the materials being processed without stopping the operation or process.

Nanometer (nm):

Unit of measurement used to specify the wavelength of light energy.
1 nm = 0.000000001 meter (10^{-9} meter).

Optical Pitch:

"Optical pitch" is the distance from the centerline of one beam to the centerline of the next beam in a transmitter-receiver beam array. It is also known as "beam spacing".

OSSD:

“OSSD” is the abbreviation for “Output Signal Switching Device” (also known as the light curtain’s safety outputs).

Protected Height:

“Protected height” is the length of the light curtain’s active sensing area ... that is the distance from the center of the first beam to the center of the last beam in the light curtains transmitter-receiver beam array.

PSDI:

“PSDI” (Presence Sensing Device Initiation) refers to the use of the sensing device (e.g. light curtain) to activate the machine and/or manufacturing process once it has been determined that a human is no longer in the hazard area.

Range (sensing range):

The specified maximum operating distance between the light curtain emitter (transmitter) and receiver (without use of deflecting mirrors). Use of deflecting mirrors typically reduces the maximum range of a light curtain.

Receiver:

The light curtain element that responds to the emitted light energy.

Resolution:

The smallest object profile dimension that will be reliably sensed or detected by a given light curtain transmitter-receiver pair.

Response Time (response speed):

The time required for the output (OSSD) of the light curtain/beam to change state in response to a change of the input signal (e.g. sensing event). Response time of a sensor becomes extremely important when calculating a suitable safety distance for a given light curtain pair.

Safety Distance:

“Safety distance” is the minimum distance from the safety light curtain to the point-of-hazard that must be respected to insure that a person will not be exposed to the hazard. It is a function of the speed of approach, and the cumulative response times of the safety light curtain, any interposing safety interfaces (such as a safety controller or safety PLC), the machine primary control element (such as a motor contactor or control relay), and the stop time of the machine.

Transmitter (photoelectric):

The light generating member of a light curtain pair. Also called the “emitter”.

UL:

Abbreviation for Underwriters Laboratories Inc. An independent testing agency for products sold in the United States. A device that is “UL listed” has been type-tested and certified to meet required electrical and/or safety standards.