

Type 4 Safety Light Curtains — Resolution, Protected Height and Safety Distance

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Selecting an electro-sensitive protective device: what Type 4 means (IEC 61496), choosing finger (14 mm), hand (30 mm) or body resolution, protected height versus the stocked XUSL4E ladder (160–1810 mm), the minimum-distance formula from ISO 13855, and the mirror-column, floor-base, cover and test-rod accessories.

Type 4 and what it buys

IEC 61496 grades electro-sensitive protective equipment by its self-monitoring integrity. Type 4 devices detect their own faults (including cross-circuits and single optical failures) to the level required for PL e / SIL 3 safety functions — press brakes, robot cells, anywhere a failure must not go undetected between test intervals. The stocked XUSL4E family is Type 4 throughout; Type 2 curtains exist in the market for PL c duty, but mixing them into a PL e loop is the classic audit failure.

Resolution: what must be detected

Resolution = the smallest opaque object the curtain is guaranteed to see, and it is chosen by what reaches through: 14 mm (finger) for point-of-operation guarding close to the hazard — stocked heights 160 mm up to the 310 mm w/ options and beyond; 30 mm (hand) for perimeter/entry guarding at moderate distance — the widest stocked ladder, e.g. 1510 mm height; multi-beam body detection (2/3/4 beams at standard heights) for access guarding where only whole-body entry matters — 2-beam/3-beam/4-beam columns and grid sets (XUSL4E 3-beam 810 mm class).

The distance formula decides everything

ISO 13855: the curtain must stand at least $S = K \times T + C$ from the hazard — K = approach speed (2000 mm/s hand within 500 mm, else 1600 mm/s), T = total stopping time (machine + curtain response + interface), C = intrusion allowance that grows with resolution ($C = 8 \times (d - 14)$ mm for $d \geq 40$ mm; fixed large C for body beams). Consequences: a 14 mm curtain can stand close ($C = 0$); a 30 mm curtain needs +128 mm; body-beam grids stand far back ($C = 850$ mm). Measure T with a stop-time meter at commissioning and after brake work — assumed stopping times are how fingers get reached.

Installation hardware

Columns and bases: mounting columns (1360 mm, 1660 mm), floor bases (single, double) and swivel bracket sets (4-piece).

Vibration: damper kits (12-damper, 4-damper) where presses shake the structure.

Protection: polycarbonate covers per height (600 mm ... 1800 mm) take the weld spatter and forklift brushes.

Verification: the matched test rod (Ø40; use the rod for the curtain's resolution) swept through the field at the three heights of EN practice, every shift or per the risk assessment.

Integration rules

OSSD outputs feed a safety relay or safety PLC input with the specified test pulses respected; muting (for pallets through a guarded opening) uses the dedicated muting arms/lamps and must be designed per IEC 62046 so product, not people, mutes the field. Floating blanking and reduced resolution reduce safety distance assumptions — re-run the S-formula whenever they are configured. Document everything: resolution, height, measured stopping time, calculated S , actual S , test-rod routine — that single sheet is what the machinery-directive file and every auditor after it wants. For door and removable-guard interlocks that complement curtains, see the interlock guide.

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