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Overview of Safeguarding Device Safety Distance Calculations

The calculation for minimum safe distance between a safeguarding device and the danger zone of a machine shall be as follows:

$$D_s = [\, K \times (T_s + T_c + T_r + T_{bm})] + D_{pf}$$

Where:

D_s = minimum safe distance between the safeguarding device and the hazard.

K = speed constant: 1 .6 m/s (63 in/s) minimum, based on the movement being the hand/arm only and the body being stationary.

Note: *A greater value may be required in specific applications and when body motion must also be considered.*

T_s = worst stopping time of the machine/equipment.

T_c = worst stopping time of the control system.

T_r = response time of the safeguarding device, including its interface.

Note: T_r for interlocked barrier may include a delay due to actuation. This delay may result in T_r being a deduct (negative value).

Note: $T_s + T_c + T_r$ are usually measured by a stop-time measuring device if unknown.

T_{bm} = additional stopping time allowed by the brake monitor before it detects stop-time deterioration beyond the end users' predetermined limits. (For part revolution presses only.)

D_{pf} = maximum travel towards the hazard within the presence-sensing safeguarding device's (PSSD) field that may occur before stop is signaled. Depth penetration factors will change depending on the type of device and application.

Safety Distance Calculations Example

K = 63 inch/sec.
$\mathbf{T_s}$ = 0.04 sec
$\mathbf{T_c}$ = zero
$\mathbf{T_r}$ = 0.04 sec
$\mathbf{T_{bm}}$ = zero
$\mathbf{D_{pf}}$ = 1.6 inch

D_s = [63 inch/sec x (0.04 sec + 0.04 sec)] + 1.6 sec

D_s =6.64 inches