

Appendix 4: Safeguard Table

Type of safeguard	Typical applications	Action of safeguard	Advantages	Limitations
Physical guards				
Fixed power transmission guard	<ul style="list-style-type: none"> V-belt drives Chain sprocket drives Motor couplings and power take-offs (PTOs) Flywheels 	<ul style="list-style-type: none"> Completely prevents hands or body parts from entering the hazardous area 	<ul style="list-style-type: none"> Provides complete protection if kept in place Easy to install 	<ul style="list-style-type: none"> May interfere with lubrication unless modified
Fixed point-of-operation guard	<ul style="list-style-type: none"> Bread slicers Meat grinders Sheet metal shears In-running nip points of rubber, paper, and textile rolls Power presses 	<ul style="list-style-type: none"> A complete enclosure that admits feed stock or removal of finished product but will not allow hands into hazardous area 	<ul style="list-style-type: none"> Provides complete protection if kept in place May leave both hands free Suitable for any type of machine clutch (part or full revolution) 	<ul style="list-style-type: none"> Generally limited to flat feed stock May require special tools to remove jammed stock May interfere with visibility
Guard (hinged or sliding) with interlocking	<ul style="list-style-type: none"> Most power presses Balers or compactors Foundry presses Robotic systems 	<ul style="list-style-type: none"> Opening the guard will stop the machine Machine will not start with guard open 	<ul style="list-style-type: none"> Leaves both hands free for feeding Opening and closing of guard can be automatic 	<ul style="list-style-type: none"> Location of controls must comply with safety distance requirements Depends on control reliability for safe functioning
Guard (hinged or sliding) with powered interlocking (guard locking)	<ul style="list-style-type: none"> Foundry tumblers Laundry extractors, dryers, and tumblers Centrifuges Paint mixers Some dough and pastry mixers 	<ul style="list-style-type: none"> Machine will not start with guard open Guard cannot be opened until machine movement is at complete rest 	<ul style="list-style-type: none"> Provides complete and positive enclosure until machine is at rest Doesn't hold up production 	<ul style="list-style-type: none"> Requires careful adjustment and maintenance May not function if there is an electrical or mechanical failure

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Automatic or semiautomatic feed with point of operation enclosed	<ul style="list-style-type: none"> Power press blanking operations Coining and stamping machines Drop chute chippers Pastry machines 	<ul style="list-style-type: none"> Stock fed by mechanisms, such as chutes, hoppers, conveyors, rolls, or movable dies Enclosure will not admit any body part 	<ul style="list-style-type: none"> Increases production Workers cannot place hands in hazardous area 	<ul style="list-style-type: none"> High installation cost for short runs May require skilled maintenance
Limited feed opening or slide travel	<ul style="list-style-type: none"> Foot-powered shears Some punch and brake presses 	<ul style="list-style-type: none"> Feed opening or machine travel is limited to 6mm (¼in.) or less Fingers cannot enter hazardous area 	<ul style="list-style-type: none"> Provides positive protection No maintenance or adjustment needed 	<ul style="list-style-type: none"> Small opening limits size of stock Requires effective supervision and training
Safeguarding devices				
Two-hand controls	<ul style="list-style-type: none"> Hand-fed power press operations Hydraulic presses Rebar formers Tube benders Paper guillotine shears 	<ul style="list-style-type: none"> Simultaneous activation of both controls initiates a machine cycle Releasing either control during cycle causes machine to stop 	<ul style="list-style-type: none"> Forces both hands out of hazardous area No interference with hand feeding No adjustments required Easy to install Allows feeding and removal of complex parts not possible with a guard 	<ul style="list-style-type: none"> Location of controls must comply with safety distance requirements Depends on control reliability for safe functioning Hands not free to support feed stock Hazards to workers other than operator must be safeguarded

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Presence-sensing device: <ul style="list-style-type: none"> • Light curtains • Radio frequency antennae • Pressure-sensitive mats 	<ul style="list-style-type: none"> • Brake presses • Part-revolution (air-clutch) presses only • Robotic systems 	<ul style="list-style-type: none"> • When sensing field is interrupted, a stop signal is sent to quickly stop the machine 	<ul style="list-style-type: none"> • Doesn't interfere with normal feeding or production • No obstruction on the machine or around the operator 	<ul style="list-style-type: none"> • Expensive to install • Location of device must comply with safety distance requirements • Depends on control system reliability for safe functioning • Hazards to workers other than operator must be safeguarded • May require frequent adjustment and calibration
Limited machine movement devices ("jog," "inch," and "setup" modes)	<ul style="list-style-type: none"> • Printing presses • Power presses (during setup and maintenance) 	<ul style="list-style-type: none"> • Provides operator or maintenance with a means to "inch" or "jog" machine movement during setup 	<ul style="list-style-type: none"> • Gives operator and maintenance safe control over hazardous machine movement 	<ul style="list-style-type: none"> • Can be hazardous if used during production mode on power presses (CSA Group standard Z142-10 (R2014) - Code for power press operation: Health, safety, and safeguarding requirements notes these must not be used for production purposes)

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Self-adjusting feed guard	<ul style="list-style-type: none"> Band saws Table saws Mitre saws Circular hand saws Jointers Wood shapers Large-capacity steel plate shears 	<ul style="list-style-type: none"> Barrier or enclosure will admit operator's hands but warn before hazardous area is reached 	<ul style="list-style-type: none"> Makes hard-to-guard machines safer Generally doesn't interfere with production Easy to install Admits varying sizes of stock 	<ul style="list-style-type: none"> Protection not complete at all times — hands may enter hazardous area Guard may be easily defeated Choice of last resort
Emergency body-contact devices: <ul style="list-style-type: none"> Crash bar Panic bar Trip wire Belly bar 	<ul style="list-style-type: none"> Trim saws Flat roll ironers Calenders Rubber mills Platen presses Conveyors Wood chippers 	<ul style="list-style-type: none"> Without intentional movement, worker contacts the emergency stop device, which sends a stop signal to the machine 	<ul style="list-style-type: none"> Makes hard-to-guard machines safer Doesn't interfere with production 	<ul style="list-style-type: none"> Requires proper installation and maintenance Depends on control-system reliability for safe functioning May require installation of a machine braking system
Passive worker restraint devices ("hold-backs")	<ul style="list-style-type: none"> Horizontal-fed sawmill chippers Soil auger feed points Power press operations 	<ul style="list-style-type: none"> Worker is tethered by a safety belt and lanyard or by hand wristlets and fixed cables, and cannot access the hazardous area 	<ul style="list-style-type: none"> Easy to install Inexpensive Permits maximum hand feeding 	<ul style="list-style-type: none"> Can be difficult to supervise Worker resistance (changing old habits) Must be adjusted to individual operator

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Active worker restraints ("pull-backs")	<ul style="list-style-type: none"> Mechanical clutch power presses Brake presses Embossing presses 	<ul style="list-style-type: none"> A cable-operated attachment connected to the operator's hands pulls them back if they remain in the hazardous area 	<ul style="list-style-type: none"> Acts even if there is an accidental mechanical repeat Easy to install Adaptable to frequent die changes 	<ul style="list-style-type: none"> Requires effective supervision Worker resistance (changing old habits) Must be adjusted to individual operator and operation
Shields	<ul style="list-style-type: none"> Lathe chucks Milling machines Drill presses Machine tools 	<ul style="list-style-type: none"> Partial barriers contain liquids and flying chips or turnings 	<ul style="list-style-type: none"> Easy to install Doesn't impede operation 	<ul style="list-style-type: none"> Provides limited protection against harmful contact with moving parts