

Machine Guarding: B11.19

Point, Barrier, Location and Priority
- Think About It



Bill La Barge
President
Machine Guard & Cover, Co.



Machine Guarding Violations

	2022	2021*	2020**	2019	2018	2017
Total Violations	1,370	1,105	1,313	1,989	1,969	1,933
Serious Violations		907	1,124	1,737	1,710	
Willful Violations		27	16	13	14	

** "During the pandemic, OSHA developed new ways of prioritizing and conducting inspections, such as remote inspections via phone or fax, as well as responding to complaints and referrals while ensuring the protection of our own field staff."*

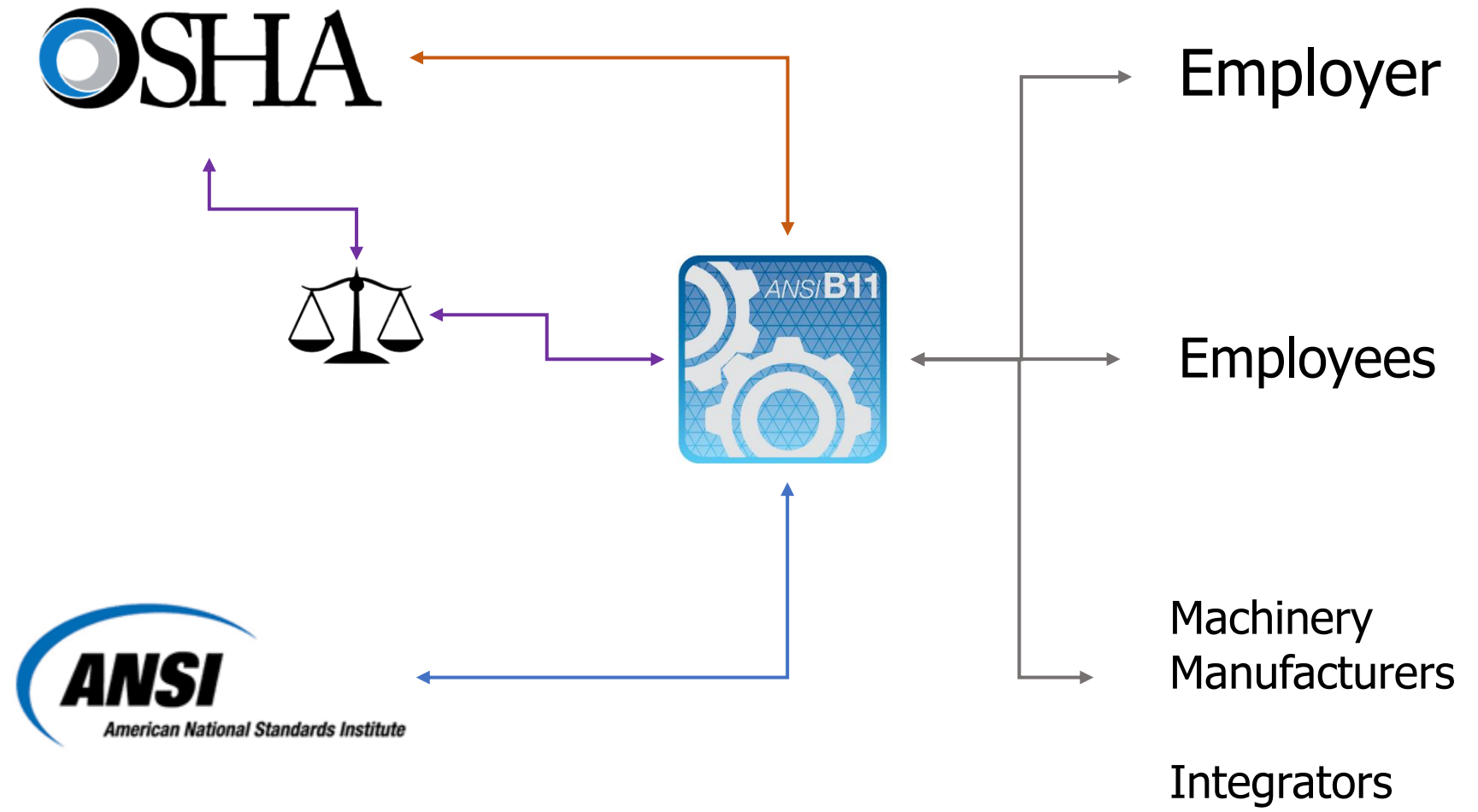
- Patrick Kapust, OSHA

*** OSHA received 15% more complaints during the first nine months of 2020 compared to the same time period of 2019, but conducted 50% fewer inspections due to the COVID-19 pandemic.*





OSHA - B11 - ANSI



B11 American National Standards

ANSI B11.0 - 2020 *Safety of Machinery*

ANSI B11.1 - 2009 (R2014) *Mechanical Power Presses*

ANSI B11.2 - 2013 *Hydraulic and Pneumatic Power Presses*

ANSI B11.3 - 2012 *Power Press Brakes*

ANSI B11.4 - 2003 (R2013) *Shears*

ANSI B11.5 - 1988 (R2013) *Ironworkers*

ANSI B11.6 - 2001 (R2012) *Manual Turning Machines*

ANSI B11.7 - 1995 (R2015) *Cold Headers & Cold Formers*

ANSI B11.8 - 2001 (R2012) *Manual Milling, Drilling, & Boring Machines*

ANSI B11.9 - 2010 (R2015) *Grinding Machines*

ANSI B11.10 - 2003 (R2015) *Metal Sawing Machines*

ANSI B11.11 - 2001 (R2012) *Gear and Spline Cutting Machines*

ANSI B11.12 - 2005 (R2015) *Roll Forming & Roll Bending Machines*

ANSI B11.13 - 1992 (R2012) *Single and Multiple-Spindle Automatic Bar, and Chucking*

ANSI B11.14 - 1996 *Coil Slitting [Withdrawn – See B11.18]*

ANSI B11.15 - 2001 (R2012) *Pipe, Tube and Shape Bending Machines*

ANSI B11.16 - 2014 (R2020) *Powder/Metal Compacting Presses*

ANSI B11.17 - 2004 (R2015) *Horizontal Hydraulic Extrusion Presses*

ANSI B11.18 - 2006 (R2012) *Machines Processing or Slitting Coiled or Non-coiled Metal*

ANSI B11.19 - 2019 *Risk Reduction Measures*

ANSI B11.20 - 2017 *Integration of Machinery into a System*

ANSI B11.21 - 2006 (R2012) *Machine Tools Using Lasers for Processing Materials*

ANSI B11.22 - 2002 (R2012) *Turning Centers and Automatic Numerically Controlled Turning Machines*

ANSI B11.23 - 2002 (R2012) *Machining Centers*

ANSI B11.24 - 2002 (R2012) *Transfer Machines*

ANSI B11.25 - 2015 *Large Machines*

ANSI B11.26 - 2018 *Electrical/Fluid Power Control Systems*

ANSI B11.27 - 202X *Electro Discharge Machines*

B11 Standard Format

ISO “A-B-C” standard of classification

- **Type-A standards** (‘basis’ or ‘foundational’ standards)
give basic concepts, principles for design, and general aspects that can be applied to machinery;
- **Type-B standards** (generic safety standards)
deal with one or more safety aspects (type B-1) or one or more types of safety devices (type B-2) that can be used across a wide range of machinery;
- **Type-C standards** (machinery safety standards)
deal with detailed safety requirements for a particular machine or group of machines. (Owner’s Manuals)

B11 Standards

A B C

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ANSI B11.26 - 2018 *Machines: Functional Safety for Equipment: General principals for the Design of Safety Control Systems*

ANSI B11.27 - 2020 *Electro Discharge Machines*

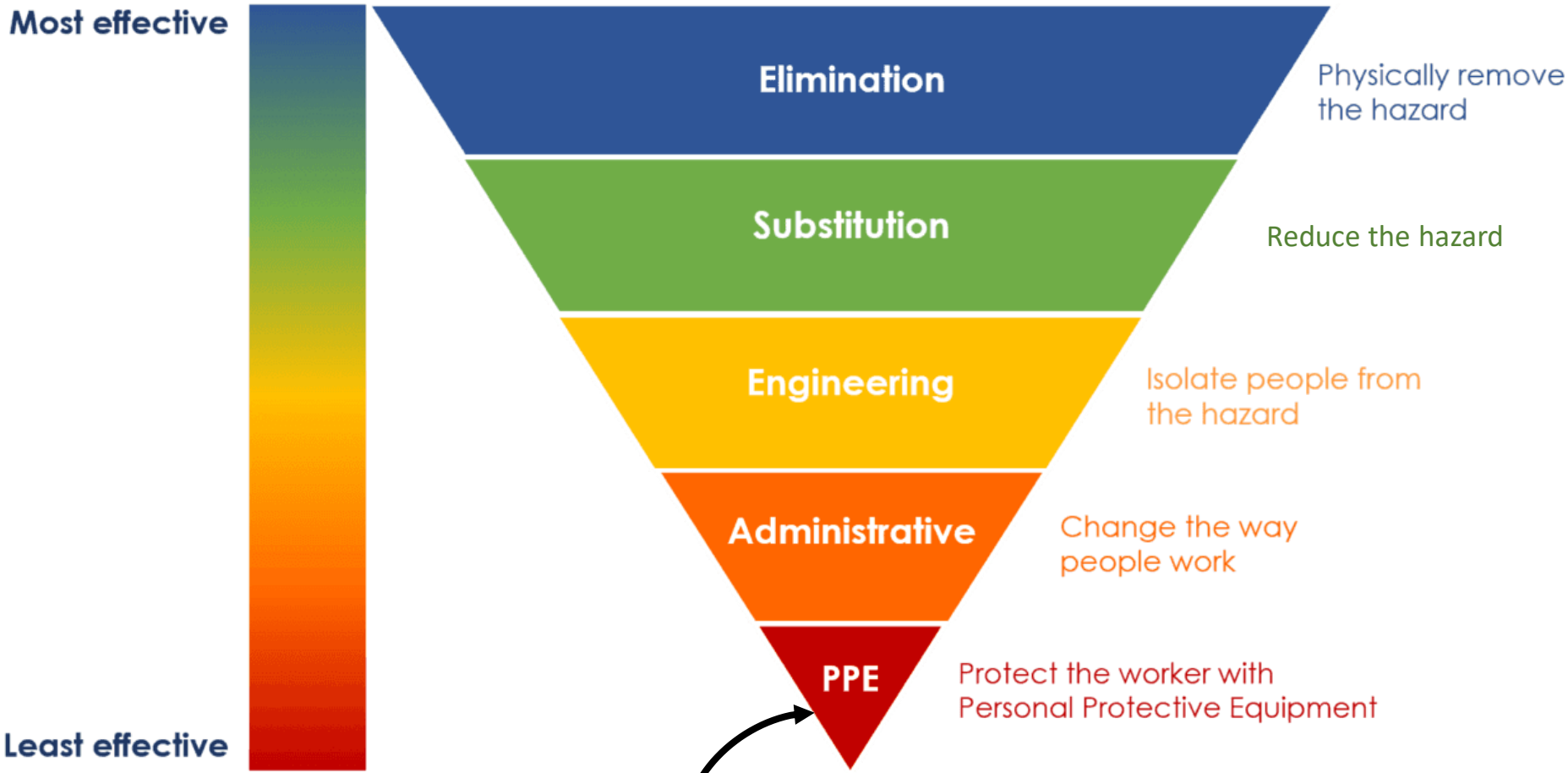


B11.0 - 2020 Safety of Machinery

The 2020 edition is a significant and substantive rewrite.

- The words "safe" and "safety" are not absolutes-
 - A change in focus to **Risk Reduction Measures**
- A major organizational revision of the standard using the Hazard Control Hierarchy as a general structure of this standard;
- Safety begins with good design.
- This standard is not intended to replace good judgment and personal responsibility.

Hazard Control Hierarchy



OSHA

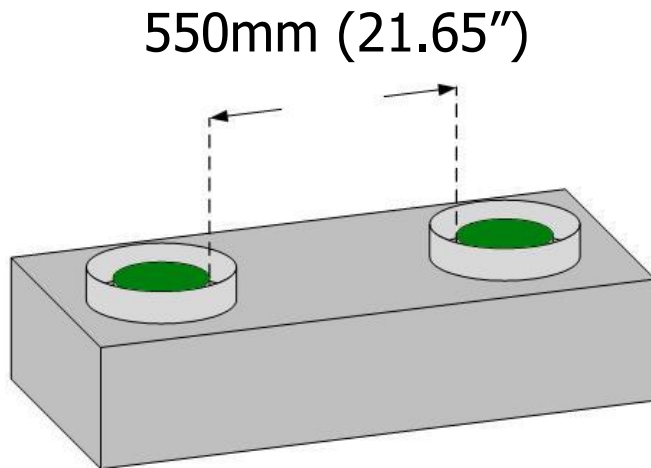
PPE is 1/2 of 1 sheet of the 255 pages of B11.19



Requirements and Explanatory Information

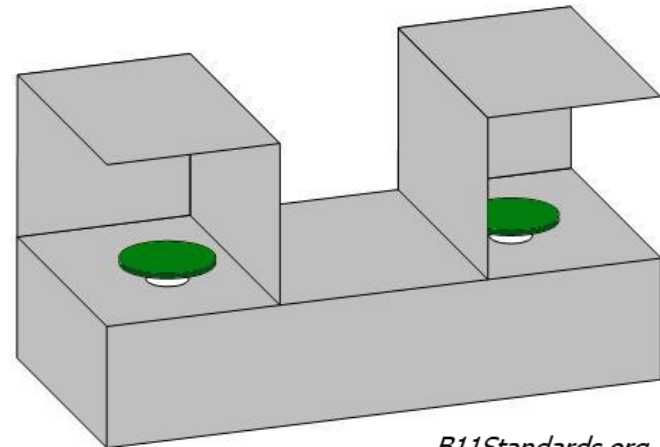
ISO Structure

10.8.1.1.2 The two-hand actuating control shall have the individual hand controls arranged by design, construction, or separation to require the use of both hands for actuation.



E10.8.1.1.2 The design or installation of the operator control should be such that the operator cannot operate the two controls by the use of one hand and an elbow (or other portion) of the same arm.

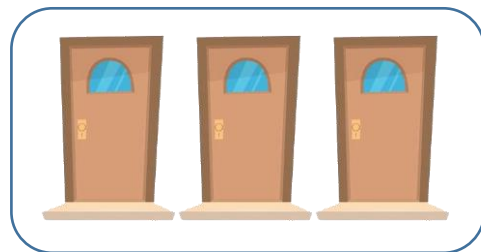
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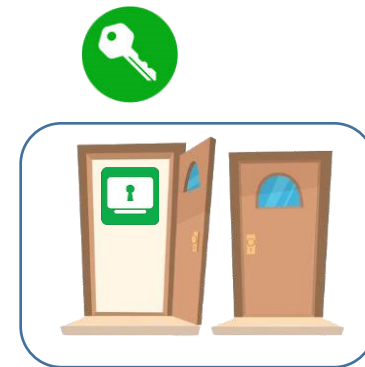
Requirements and Explanatory Information

Explanatory information contains additional detail

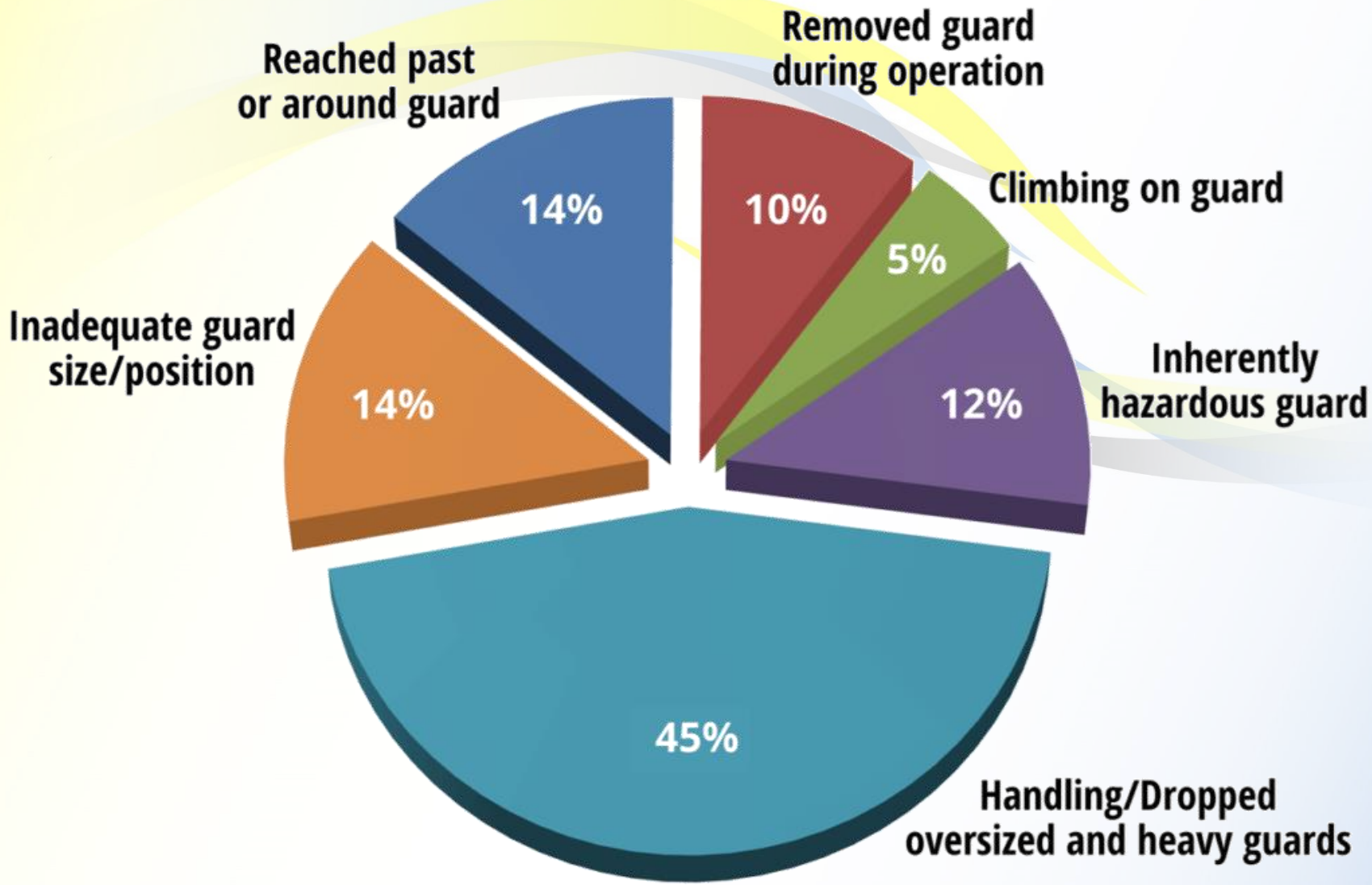
10.3.2.4 Keys shall be difficult to reproduce and shall have duplicates only where the same function must be repeated at multiple locations on the same application.



E10.3.2.4 Keys or locks may have the same cut if they perform the identical function.



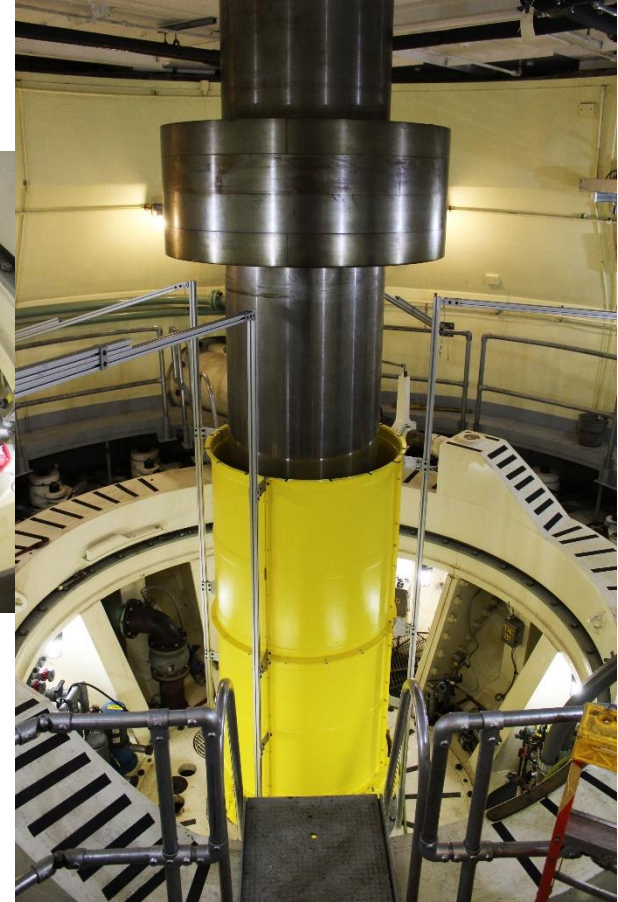
Common Guarding Issues



Heavy Guarding Back injury



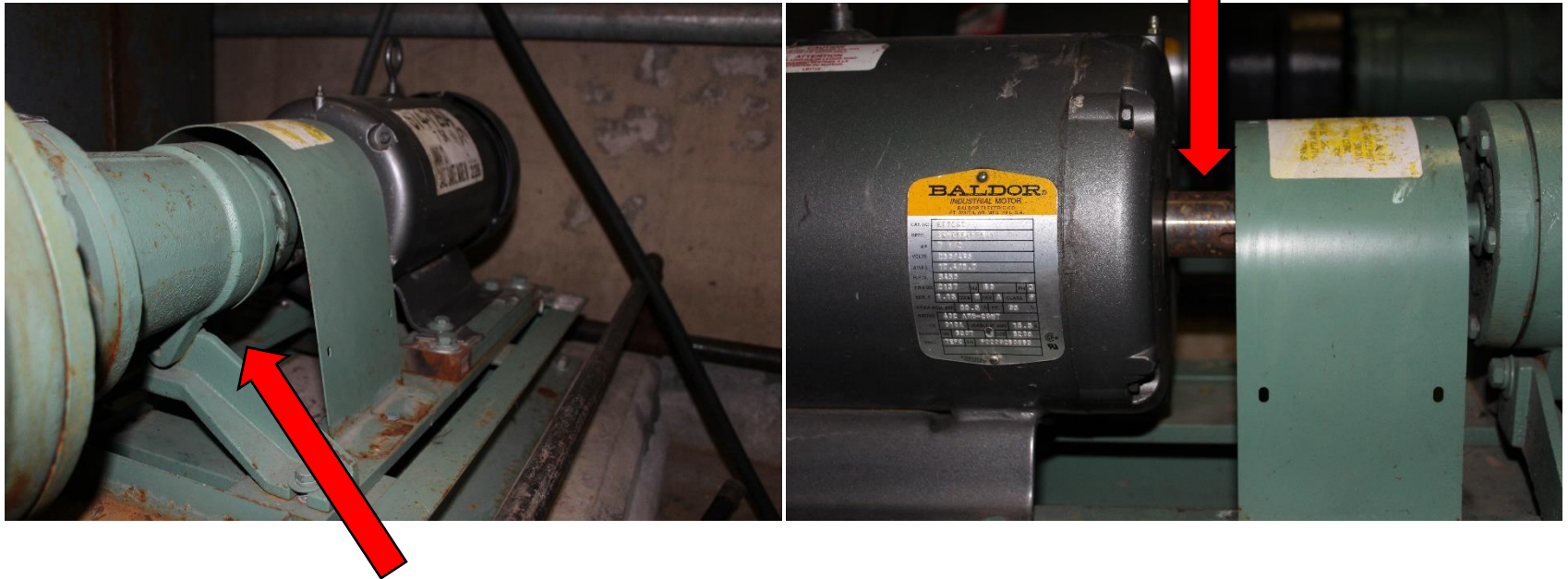
Heavy Guarding- Material Selection



Inadequate Guard Size/Position



Inadequate Guard Size/Position



B11.19 Informative Annex

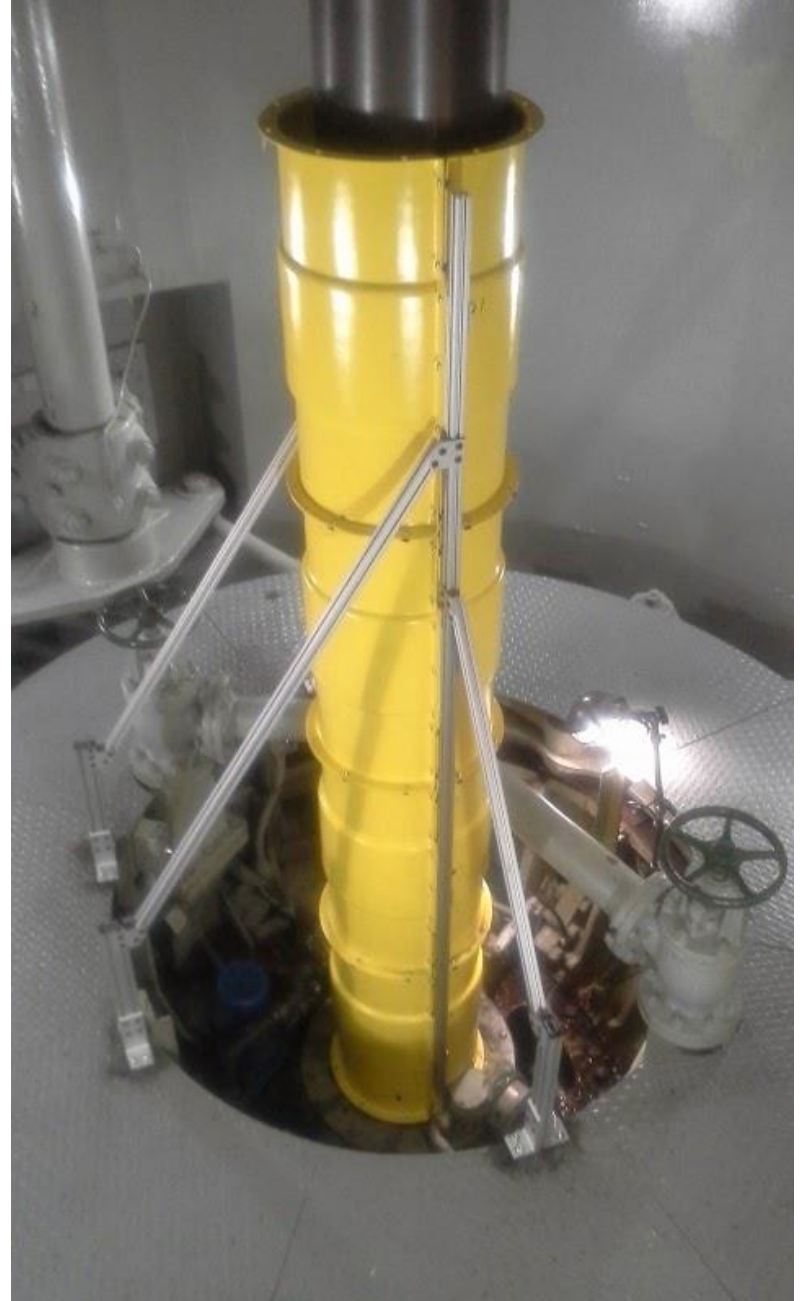
Opening size allowable distance to hazard guidelines



Guard Properly Sized



Inadequate Size



Reach Past / Around



Reach Past / Around



Chain Guard Proper installation



What is most commonly missed



What is most commonly missed



Removed During Operation

Why?

- Inspection
- Lubrication
- Clear Jam
- Tensioning
- Troubleshooting
- Sabotage

Inspection

- Clear Guards and Windows



B11.19 Informative Annex

Transparent Guarding

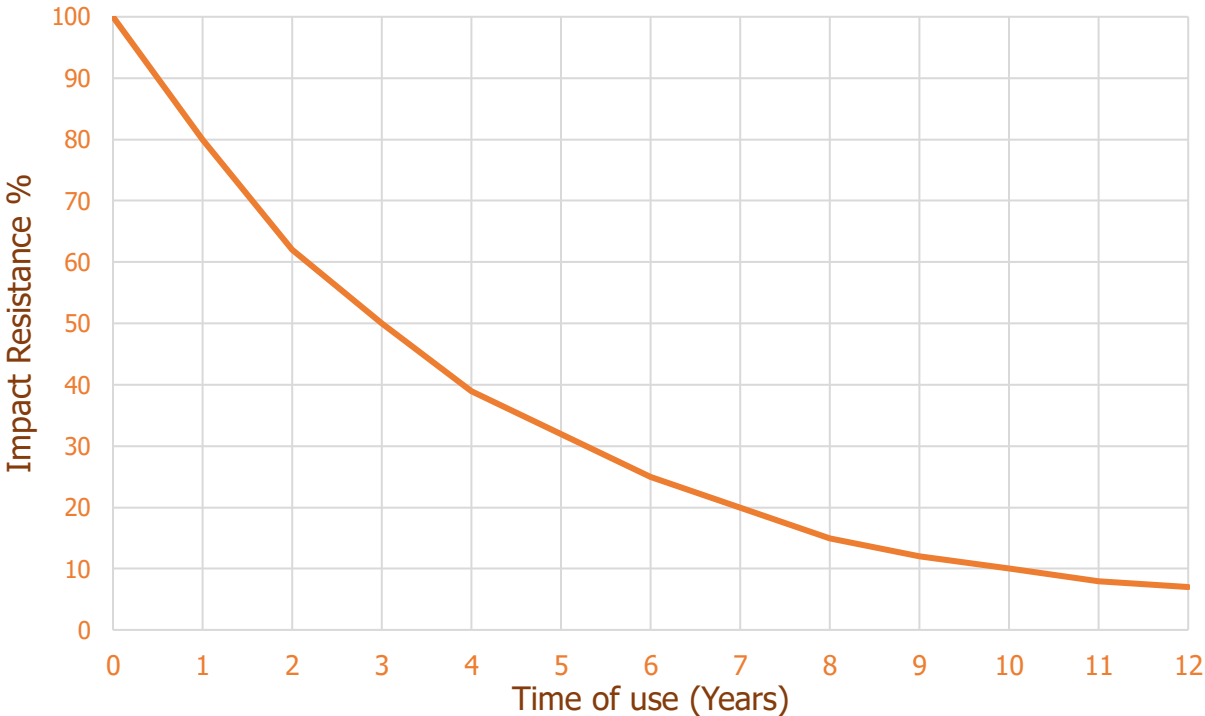


Figure G.1 – Aging curve of unprotected polycarbonate (averaged test points)
(from ISO 23125)

Note: This data pertains to a particular polycarbonate with particular characteristics tested in a research application. Exercise care in attempting to extrapolate these results to other materials (e.g., acrylics, glass, PETG, CAB, etc.).

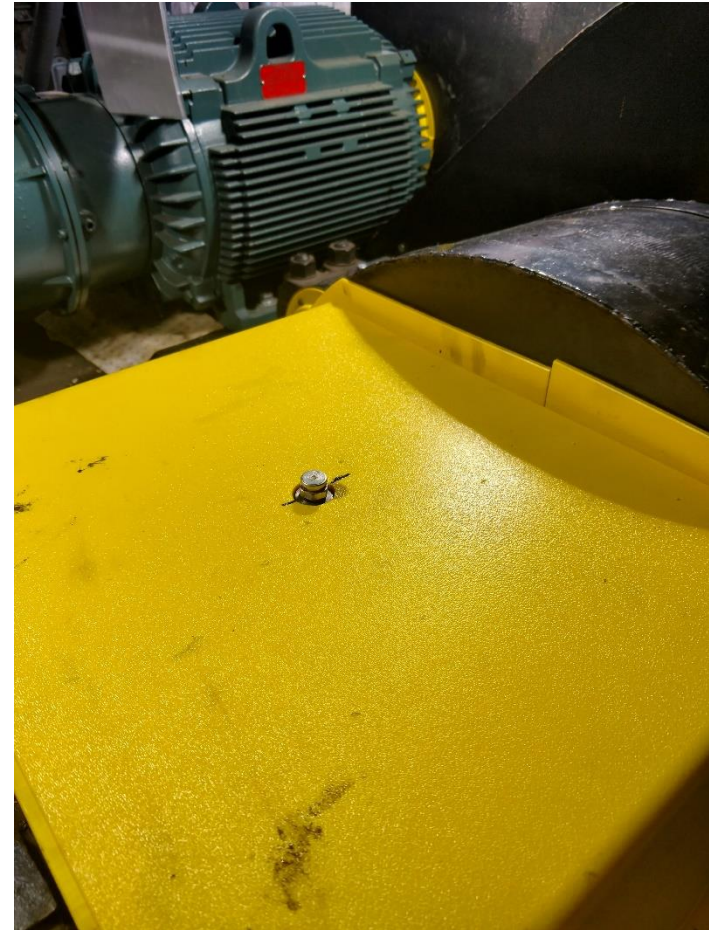


Removed during Operation

Lubrication Solution



Extend Fitting
through Guard



Movable Guards



Access Ports

Hinged or Sliding

Hand Tool Fasteners

Keyed

Interlocked

Interlock vs Key vs Fastener

- Frequency of Required Access
- Training Level of Employee
- Administrative Controls

Interlocks

Clause 8.4

- Will not close without intentionality
- Will not initiate Hazardous motion (Restart as separate function)
- Opening will trigger Stop command
- Hazard must cease before it can be reached (timer may be necessary)
- Positive Mode (Is Locked) for initiation
- Use only approved Interlocks

Inherently Hazardous Guard



Climbing on a Guard



Guard Material

8.1.1.1 Material used in the construction of guards shall be of such design and strength as to protect individuals from identified hazards.

E8.1.1.1 The selection of the guard material should take into account both the operational and performance characteristics, as well as the applicable environmental factors which can degrade its strength (including, but not limited to chemicals, UV, temperature, radiation etc).

OSHA does NOT certify guards

- Do not require hand tool to remove
- Can be deformed and allow access while still mounted
- Can remain mounted and create additional hazard
- Grease fitting is tasked with two jobs
- Cannot be sealed for wash-down situations



Mounting Hardware Selection



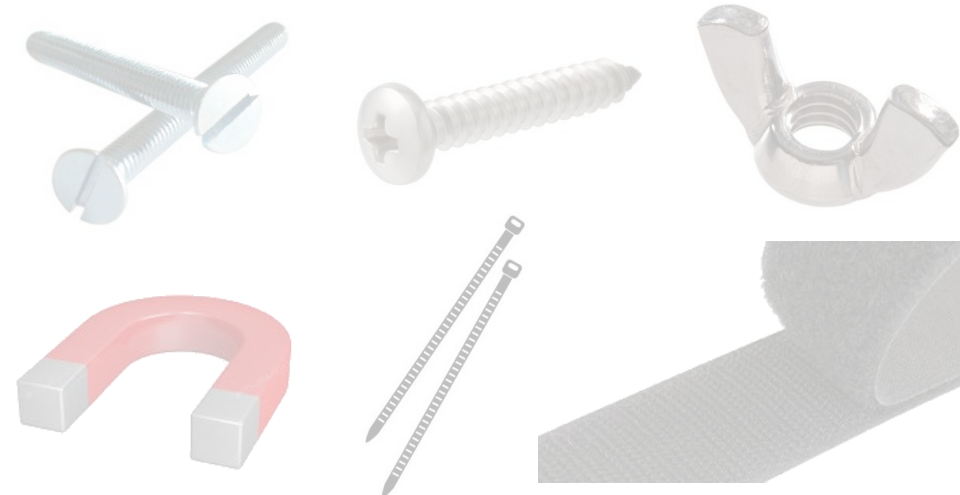
B11.19 Risk Reduction Measures

Examples of types of fasteners that provide a low level of tamper resistance and should not be used are:

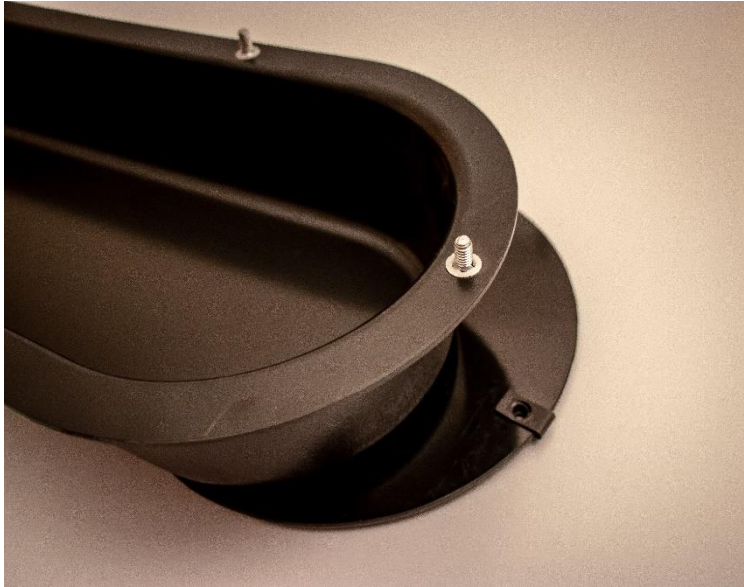
- slotted or Phillips head screws
- wing nuts
- magnets
- latches and hasps
- hooks and eyes
- zip ties
- hook and loop / pile

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Recommended Hardware:
Button-head socket cap screws

Security version



Captured Fasteners Preferred



Not always possible due to orientation

Partial Guards

Examples of a partial guard include,
but are not limited to:

- side guards on mills / calenders;
- self-adjusting guards / blade guards on saws;
- chuck guards on a drill press and lathe;
- barrier post on forming rolls;
- point of operation guard on a grinding wheel.

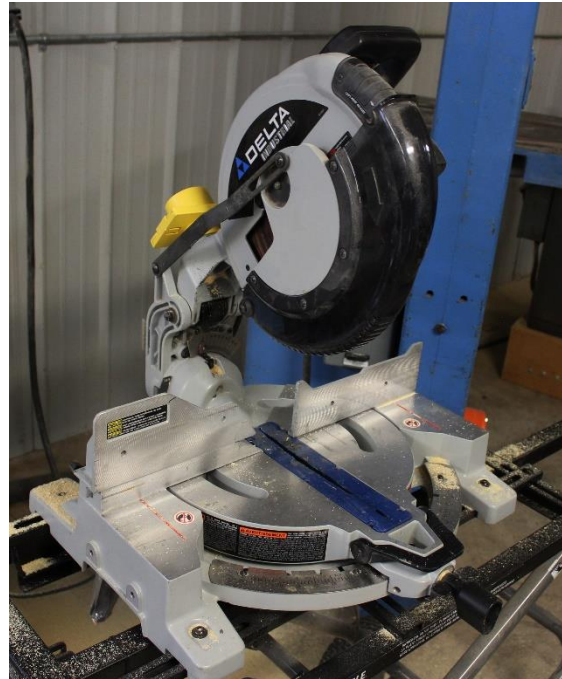


Manual Adjust/Self Adjust

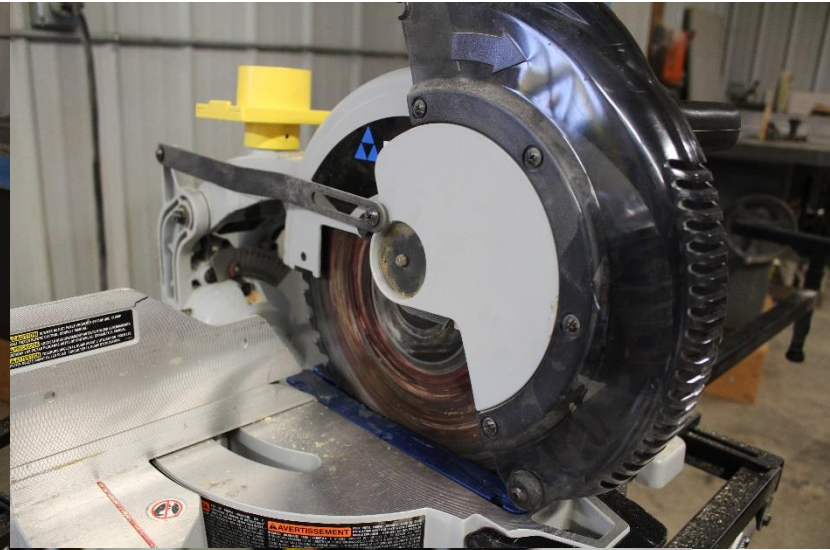
Clause 8.5/8.6



Easy to Use
Stay in Place

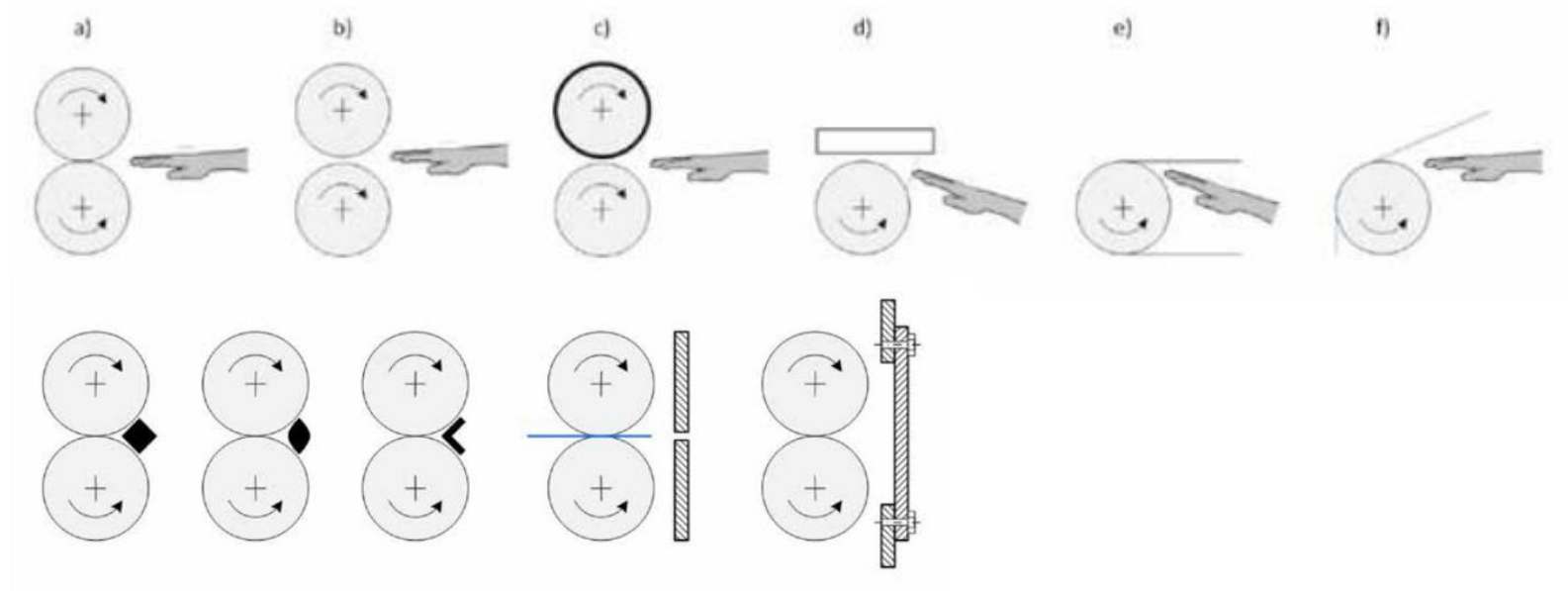


Properly Installed
And SET UP



Nip Guards Section 8.9

Annex F



Nip Clearance

Penny Gap

May NOT create Greater Hazard

Area Guarding vs Point Guarding

Point Guarding- Safe for Everyone
Prevents Access only to the Hazard

Area Guarding- Will require
Administrative Controls

Minimum Height -54"
Maximum Gap underneath -7"

Barrier (Perimeter) and Point Guarding

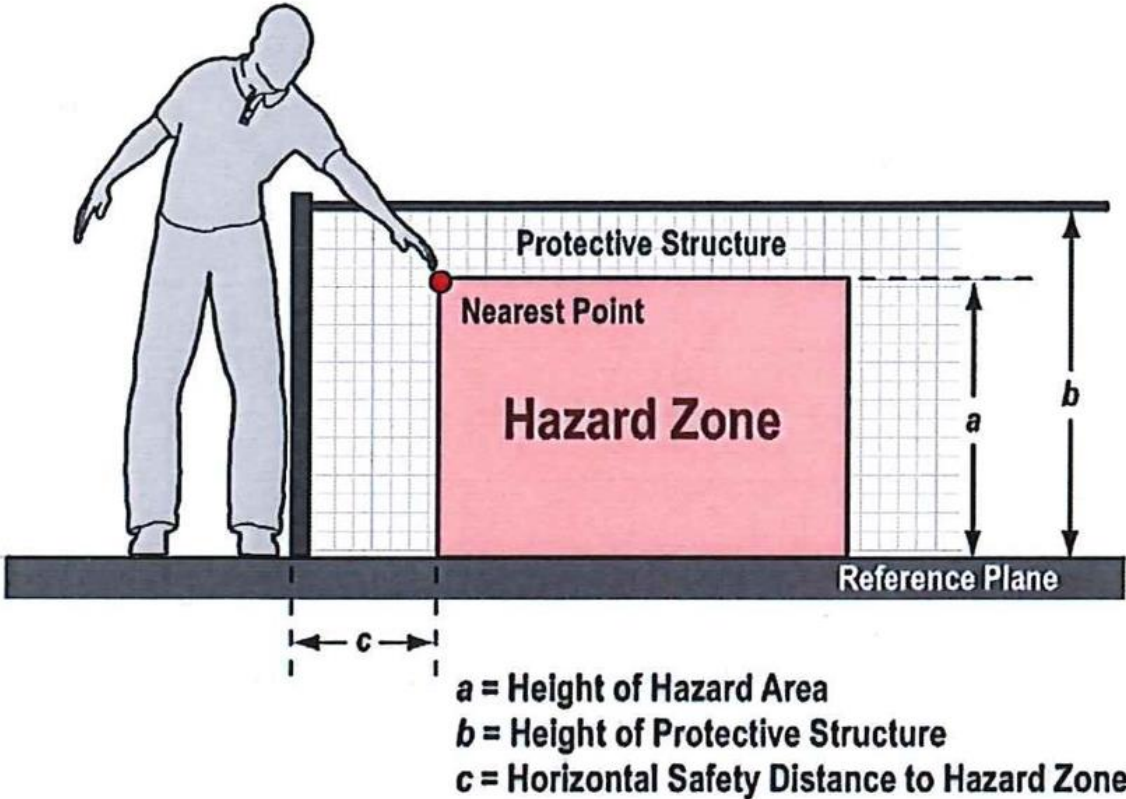


Barrier (Perimeter) and Point Guarding



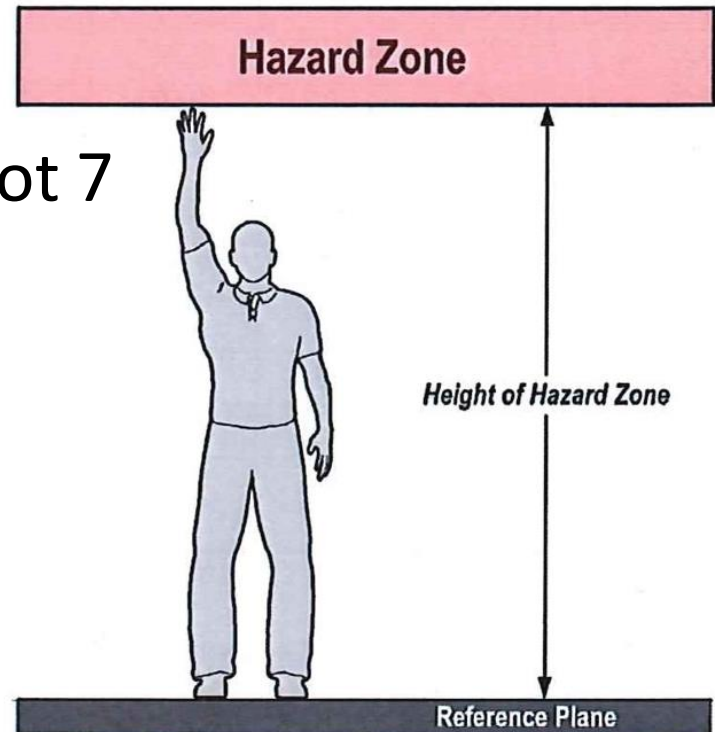
B11.19 Informative Annex

Reaching Distances



Reach Distance- Overhead

- OSHA 7ft rule vs ANSI/ISO
- OSHA rules set in 1970's from state standards set even earlier.
- Average US male height 5 foot 7
- 95th percentile is 6 foot 2"
- Standing reach is 8 foot 4"
- B11.19 Clause 7.4
- 8 Foot 8 Inches



Reach Distance- Overhead

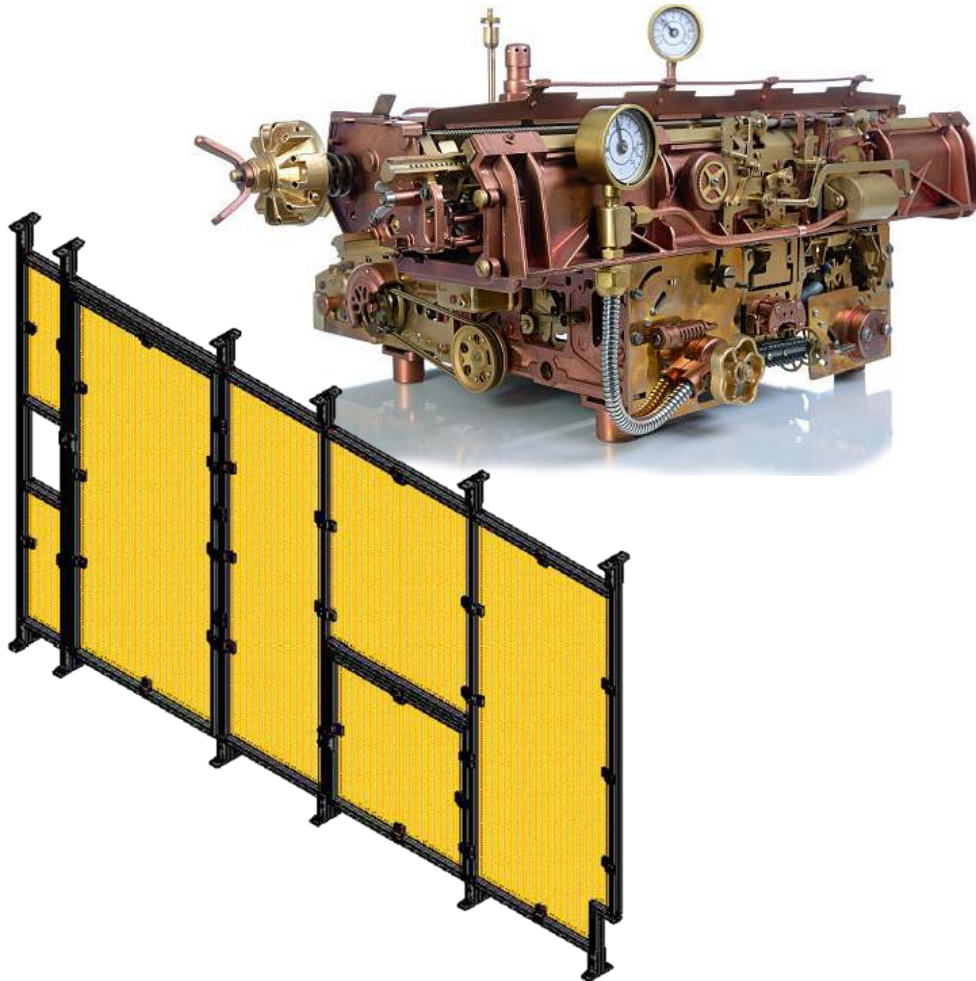
Other considerations

- Ladders/Steps
- Scissor lifts
- Elevated Walkways

B11.19 Whole Body Access Perimeter Guarding

Clause 9.11

- Where an individual(s) can be in the hazard area
- No longer simple



Questions?



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Barrier (Perimeter) and Point Guarding



Guarding Priorities

