

Hand and Power Tool Safety

OSHA 29 CFR 1910 Subpart P and 1926 Subpart I

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Today's Agenda

01

Why tool safety matters
Injury data, employer and employee duties

02

Scope: 1910 vs. 1926
Which standard applies where

03

Hand tools and grips
Condition, selection, handling

04

Guarding: never remove it
Point of operation, guard types

05

PPE for tool work
Eyes, face, hearing, hands, feet

06

Insulation, cords, connectors
Grounding, GFCI, plug integrity

07

Pneumatic and hydraulic tools
Hoses, fittings, pressure, fluids

08

Compressed air and gas cleaning
The 30 psi rule and chip guarding

09

Inspection and knowledge check
Take-home rules and 3 questions

Approximate timing: 5 minutes per topic, 10 minutes for discussion and the knowledge check.

Why Tool Safety Matters

- Hand and power tools are so routine that hazards stop being noticed — that familiarity is the hazard.
- The five hazard sources OSHA identifies:
  - Point of operation contact — blades, bits, wheels, moving parts
  - Flying particles, chips, sparks and splinters
  - Electrical shock from damaged insulation, cords or grounding
  - Harmful dusts, fumes, mists, vapors and gases released by the tool
  - Noise and hand-arm vibration over long exposures
- Most tool injuries are eye, hand and finger injuries — and most are preventable with a guard, PPE, or a tool taken out of service.

Shared responsibility

Employer
Provide safe tools, keep guards in place, supply and require PPE, train workers, and remove defective tools from service.

Employee
Use the right tool for the job, inspect before use, wear the required PPE, never defeat a guard, and report damaged tools immediately.

1910.242(a) and 1926.300(a): employer is responsible for the safe condition of all tools — including employee-owned tools.

Scope: 29 CFR 1910 vs. 29 CFR 1926

	General Industry — 1910 Subpart P	Construction — 1926 Subpart I
General requirements	1910.242 — hand and portable powered tools	1926.300 — general requirements, guarding
Guarding	1910.243 — guarding portable powered tools	1926.300(b) — guards required on all moving parts
Electric tools	1910.243(a), 1910.334 — grounding, insulation	1926.302(a), 1926.404(b) — GFCI or assured grounding
Pneumatic tools	1910.243(b) — hose, couplings, airless spray	1926.302(b) — hose retainers, 30 psi cleaning limit
Hydraulic tools	1910.244(b) — fluids, pressure limits	1926.302(d) — manufacturer's safe pressure limits
Abrasive wheels	1910.215, 1910.243(c)	1926.303 — guarding, ring test, tool rests
Compressed air cleaning	1910.242(b) — reduce to <30 psi	1926.302(b)(4) — <30 psi plus chip guarding

If construction, alteration or repair work is being performed, 1926 applies. Shop and maintenance work falls under 1910.

Hand Tools: The Right Tool, In Good Condition

- Greatest hazards come from misuse and poor maintenance, not from the tool itself.
- Take out of service: cracked or loose handles, mushroomed chisel heads, dull blades, sprung wrench jaws, chipped hammer faces.
- Never use a screwdriver as a chisel or pry bar, or a wrench as a hammer.
- Impact tools — chisels, wedges, drift pins — must be redressed when heads mushroom; flying fragments cause eye injuries.
- Keep cutting edges sharp and directed away from your body and from other workers.
- Iron or steel tools are prohibited where flammable vapors exist — use spark-resistant brass or beryllium alloy.



1910.242(a) • 1926.301 — hand tools must be maintained in safe condition; damaged tools removed from service.

Grips, Stance and Handling

- Grip a striking tool near the end of the handle — choking up reduces control and transfers shock to the wrist.
- Both hands on any power tool that has a second handle; keep the auxiliary handle installed.
- Keep grips clean and dry — oil, grease and mud are the most common cause of slips onto a moving blade.
- Hold portable tools by the insulated grip surface, never by the cord, hose or trigger.
- Brace your stance and body position so a bind or kickback cannot pull you into the cutting path.
- Anticipate torque reaction — a bound bit turns the tool, not the work.
- Never carry a tool by the cord or hose, and never hoist or lower a tool by its cord.



1926.301(a) • 1910.242(a) — safe handling and condition of hand and portable powered tools.

Guarding: What Must Be Covered

- Every exposed moving part that can cause injury must be guarded: belts, gears, shafts, pulleys, sprockets, flywheels, chains, drums.
- Point-of-operation guarding is required wherever a machine performs work on material.
- Guards must protect the operator and everyone nearby — not just the person holding the tool.
- Portable circular saws over 2 in.: upper guard fixed, lower guard retracts and must return automatically.
- Abrasive wheels: guard covering spindle end, nut and flange; tool rest within 1/8 in.; tongue guard within 1/4 in.
- Constant-pressure switches required on portable grinders, circular saws, chain saws and percussion tools.



1910.243 • 1926.300(b), 1926.303 — machine and point-of-operation guarding, abrasive wheel requirements.

Never Remove or Defeat a Guard

A guard comes off only for repair or blade change — and goes back on before the tool is used.

- Wiring a saw guard open, removing a grinder guard, or zip-tying a trigger is a willful violation.
- Excuses that do not hold up: "it slows me down," "the guard binds," "it's a one-minute cut."
- If a guard interferes with the work, the tool or method is wrong — get the right tool.
- A tool with a missing guard is tagged out of service, not used "carefully."
- Use the manufacturer's replacement guard; shop-made shields are not equivalent.



1926.300(b)(1) — guards shall not be removed or made ineffective while the tool is in use.

Bench and Abrasive Wheel Specifics

- Ring-test every abrasive wheel before mounting; a dull thud means a cracked wheel — destroy it.
- Run a newly mounted wheel at operating speed for one minute, standing to the side, before grinding.
- Never exceed the maximum rpm marked on the wheel; match the tool's rpm to the wheel's rating.
- Tool rest gap 1/8 in. maximum, adjusted only when the wheel is stopped.
- Never grind on the side of a straight wheel unless it is designed for side grinding.
- Keep a fire extinguisher and a clear area behind the work — sparks travel 30 feet or more.



1910.215 • 1926.303 — abrasive wheel machinery: guarding, speed, ring test, work rests.

PPE for Tool Work

Eyes	ANSI Z87.1 safety glasses with side shields at all times; goggles for dust and chips
Face	Face shield over glasses for grinding, cutting, chipping and overhead work
Hearing	Plugs or muffs above 85 dBA — most grinders, saws and impact tools exceed it
Hands	Cut- and impact-resistant gloves — but never gloves near rotating bits or blades
Feet	Safety-toe footwear; metatarsal guards where heavy tools or material can drop
Respiratory	Required for silica, lead, wood dust and fumes; needs fit test and a written program



1910 Subpart I • 1926 Subpart E — PPE selection based on a documented hazard assessment.

Eye and Face Protection in Depth

- Roughly 90% of tool-related eye injuries involve workers who were wearing no eye protection or the wrong type.
- A face shield is never a substitute for safety glasses — it is worn over them.
- Match the protector to the hazard: impact, dust, chemical splash, molten metal, or optical radiation.
- Prescription glasses are not safety glasses; use Z87-rated prescription eyewear or over-glasses.
- Inspect for pitting and scratches — a fogged or pitted lens gets replaced, not tolerated.
- Bystanders inside the flying-particle zone need the same protection as the operator.



1910.133 • 1926.102 — eye and face protection, ANSI Z87.1 compliance.

Electrical Safety: Insulation and Grounding

- Every portable electric tool must be either three-wire grounded, double insulated, or powered from an isolated low-voltage system.
- Double insulated tools carry the square-within-a-square mark and a two-prong plug — the plastic housing is the second barrier.
  - A cracked double-insulated housing destroys that protection: tag it out.
- Three-wire tools must keep the grounding pin intact — never cut it off or use a cheater adapter.
- Do not operate electric tools in damp or wet locations unless approved for it, and never while standing in water.
- De-energize and unplug before changing blades, bits or accessories, or making any adjustment.
- Store tools dry; moisture inside a motor housing defeats insulation.



1910.243(a)(5), 1910.334 • 1926.302(a), 1926.404(f)(7) — grounding and double insulation of portable tools.

Cords, GFCI and the Assured Grounding Program

- Construction sites need GFCI protection on 120V 15/20/30-amp receptacles, or a written Assured Equipment Grounding Conductor Program.
- Use only heavy-duty, three-wire extension cords rated for hard or extra-hard usage — no household cords.
- Inspect every shift: cuts, abrasion, exposed conductors, taped repairs, missing strain relief.
  - Taped or spliced cords are not repaired cords — remove them from service.
- Keep cords out of walkways, off sharp edges, away from heat, oil and water.
- Unplug by the plug body — yanking the cord is how grounding pins fail.
- Do not fasten cords with staples or hang them on nails or wire.



1926.404(b)(1)(ii)-(iii) — GFCI or AEGCP required • 1910.334(a) — cord and plug inspection.

Plugs, Connectors and Fittings

- Attachment plugs and receptacles must not be altered to defeat the grounding pin or to accept a different configuration.
- Plug bodies must be intact — no cracked shells, loose blades, exposed terminals or missing covers.
- Use locking-type or twist-lock connectors where accidental disconnection creates a hazard.
- Connectors used outdoors or in wet locations must be listed for that environment and kept off the ground.
- Match amperage and voltage ratings; a connector run above its rating overheats at the contacts.
- Pneumatic quick-connect fittings must be the safety-exhaust type on tools where sudden disconnection could whip the hose.



1910.334(a)(2)(ii) • 1926.405(a)(2)(ii)(J) — attachment plug and receptacle integrity.

Pneumatic Tools

- The tool must be secured to the hose by a positive means — a clip or retainer — so it cannot be ejected.
- Safety clips or whip checks on every hose connection over 1/2 in. inside diameter.
- Never point an air tool at anyone, and never "dust off" clothing or skin with the hose.
- Disconnect the air supply and bleed the line before changing accessories or clearing a jam.
- Nailers over 100 psi need a muzzle safety device that blocks discharge off the work surface.
- Hoses across walkways are a trip and abrasion hazard — route them overhead or along the wall.
- Hearing and eye protection mandatory; jackhammers add vibration and silica controls.



1926.302(b)(1)-(10) • 1910.243(b) — pneumatic powered tool requirements.

Hydraulic Tools and Jacks

- Hydraulic fluid must be fire-resistant and hold its properties at extreme operating temperatures.
- Never exceed the manufacturer's safe operating pressure for hoses, valves, pipes, filters and fittings.
- Pinhole leaks inject fluid through skin — check for leaks with cardboard, never with a bare hand.
- Jacks must be marked with their rated load and must never be loaded beyond it.
- Every jack needs a positive stop; block or crib the load right after lifting.
- Set jacks on a level, firm base; use blocking under the base on soft ground.
- Inspect jacks on schedule: every 6 months in constant use, immediately after severe service.

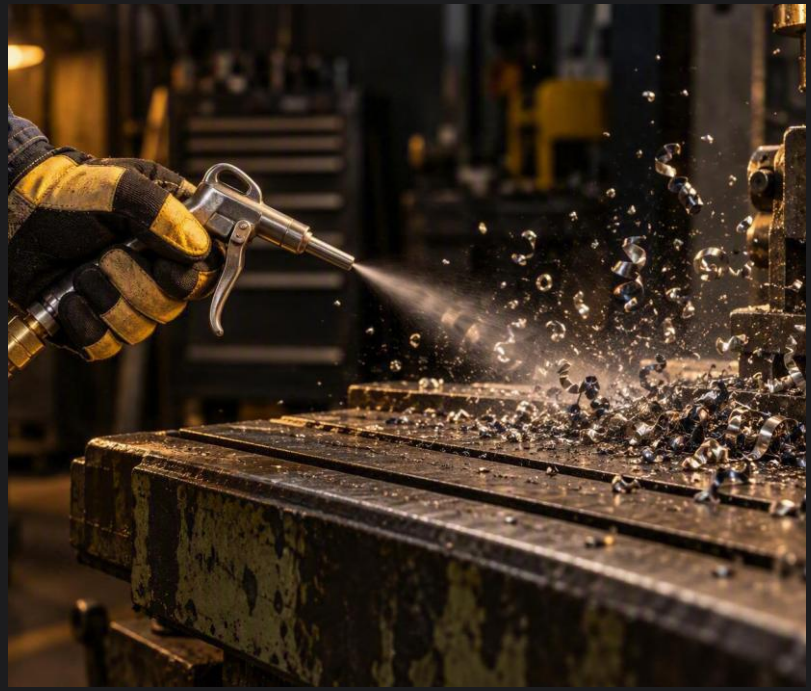


1926.302(d) • 1910.244(a)-(b) — hydraulic power tools and jacks.

Compressed Air and Gas Cleaning

Compressed air for cleaning: under 30 psi, and only with effective chip guarding and PPE.

- The 30 psi limit is the dead-ended nozzle pressure — use a relieving-type safety nozzle.
- Chip guarding: a barrier, shield or nozzle design that keeps chips off the operator and bystanders.
- Never clean clothing, hair or skin with air — it can enter the bloodstream through broken skin.
- Vacuum or sweep first; air is the last resort, not the default.
- Gas cylinders: secure upright, caps on, correct regulator, no oil or grease on oxygen fittings.
- Never substitute compressed gas or oxygen for shop air.



1910.242(b) • 1926.302(b)(4) — compressed air used for cleaning reduced to less than 30 psi with chip guarding.

Inspect, Tag Out, and Report

01

Before each use

Check housing, guard, cord, plug, hose, fittings, switch action and accessory condition.

02

Recognize defects

Cracks, frays, burn marks, loose guards, odd noise, sparking, overheating, fluid leaks.

03

Tag and remove

Red danger tag, disconnect from power or air, and physically remove the tool from the work area.

04

Report and record

Tell the supervisor, log the defect, and confirm the tool is repaired by a qualified person before return.

A defective tool that stays on the bench will be picked up by someone who does not know it is broken.

1910.242(a) • 1926.300(a) — defective tools shall not be used and must be removed from service.

Hammers: Good vs. Bad Practice

SAFE PRACTICE



Sound handle, clean flat face, gripped near the end of the handle for control.

UNSAFE — STOP WORK



Cracked handle and a chipped, mushroomed face — the head can fly off or shed fragments.

1910.242(a) • 1926.301(a) — tools maintained in safe condition; damaged tools removed from service.

Screwdrivers: Good vs. Bad Practice

SAFE PRACTICE



Tip sized to the screw and fully seated; work clamped, not held in the hand.

UNSAFE — STOP WORK

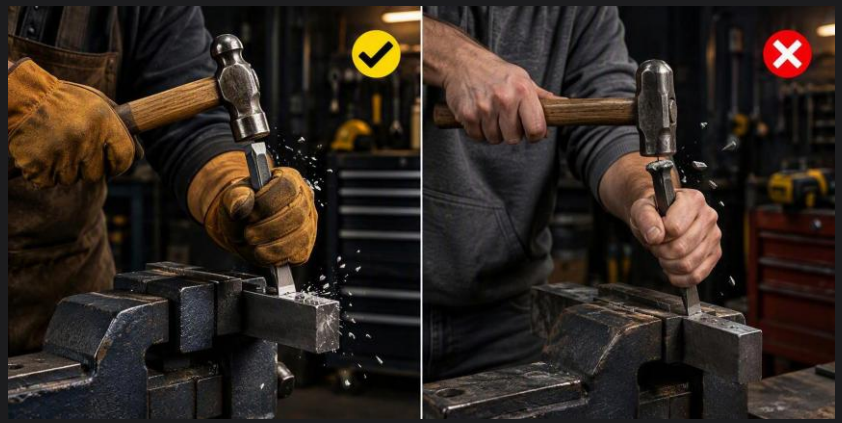


Used as a pry bar with a worn tip and cracked handle — slips, stabs and shock hazard.

1926.301(a) — use each tool only for the purpose it was designed for.

Chisels and Punches: Good vs. Bad Practice

SAFE PRACTICE



Head dressed square and clean; both hands gloved and the work clamped.

UNSAFE — STOP WORK

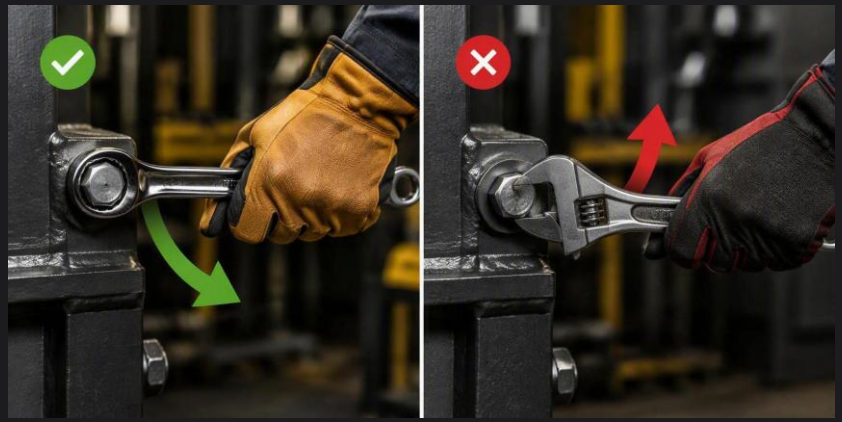


Mushroomed, cracked head with curling burrs — fragments fly at eye level when struck.

1926.301(d) — impact tools kept free of mushroomed heads.

Wrenches and Pliers: Good vs. Bad Practice

SAFE PRACTICE



Correct size, fully seated on the fastener, pulled rather than pushed.

UNSAFE — STOP WORK



Sprung jaws on a rounded bolt plus a cheater bar — the classic knuckle and fall injury.

1926.301(a) • 1910.242(a) — defective and misused tools shall not be used.

Utility Knives: Good vs. Bad Practice

SAFE PRACTICE



Retractable blade, fresh edge, cutting away from the body on a stable surface.

UNSAFE — STOP WORK



Blade left extended and rusty among loose tools — cuts the next hand into the box.

1926.301(c) — blades retracted or guarded; keep cutting edges sharp.

Handsaws and Hacksaws: Good vs. Bad Practice

SAFE PRACTICE



Sharp saw, workpiece clamped to sawhorses, balanced stance.

UNSAFE — STOP WORK



Rusty broken teeth and a board balanced on a knee — the saw binds and jumps.

1926.301(a) — hand tools maintained in safe condition and used safely.

Circular Saws: Good vs. Bad Practice

SAFE PRACTICE



Lower guard intact and self-returning, sharp blade, cord routed clear of the cut.

UNSAFE — STOP WORK



Guard wired back and a frayed cord underfoot — amputation plus shock exposure.

1926.300(b)(1), 1926.304(d) • 1910.243(a)(1) — guards shall not be removed.

Angle Grinders: Good vs. Bad Practice

SAFE PRACTICE



Wheel guard installed, side handle attached, two-hand grip, sparks directed away.

UNSAFE — STOP WORK



No guard, no side handle, cracked disc — a burst wheel at 11,000 rpm.

1926.303(c) • 1910.243(c) — abrasive wheels guarded; damaged wheels destroyed.

Bench Grinders: Good vs. Bad Practice

SAFE PRACTICE



Eye shield in place, tool rest within 1/8 in., wheel guard covering the spindle.

UNSAFE — STOP WORK



Missing shield and a wide tool-rest gap — the work is dragged into the wheel.

1910.215(a)(4) • 1926.303(c) — work rest gap 1/8 in. maximum.

Corded Drills: Good vs. Bad Practice

SAFE PRACTICE



Intact rubber cord, molded three-prong plug, auxiliary handle attached.

UNSAFE — STOP WORK



Taped cord repair, cracked housing and a cut-off ground pin — an electrocution waiting to happen.

1910.334(a)(2)(ii) • 1926.302(a) — plugs never altered to defeat grounding.

Cordless Tools: Good vs. Bad Practice

SAFE PRACTICE



Undamaged pack on the manufacturer's charger, stored clean and dry.

UNSAFE — STOP WORK



Swollen, scorched pack with corroded contacts tossed among metal scrap — fire and short-circuit risk.

1926.302(a) • manufacturer's instructions — damaged battery packs removed from service.

Reciprocating Saws: Good vs. Bad Practice

SAFE PRACTICE



Blade clamped tight, shoe held against the work, two-hand grip on a clamped pipe.

UNSAFE — STOP WORK



Bent blade in a loose clamp with the cord wrapped around the housing — kickback and cord failure.

1926.300(a) • 1910.242(a) — tools in safe operating condition before use.

Table and Miter Saws: Good vs. Bad Practice

SAFE PRACTICE



Blade guard, riving knife and anti-kickback pawls in place; push stick within reach.

UNSAFE — STOP WORK

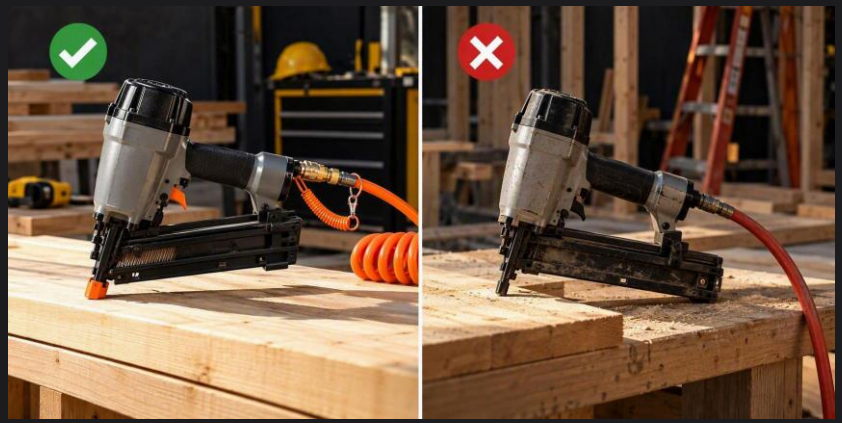


Guard on the floor and offcuts piled on the table — kickback drives material and hands into the blade.

1926.304(d), (f) • 1910.213 — guarding of portable and stationary saws.

Pneumatic Nailers: Good vs. Bad Practice

SAFE PRACTICE



Muzzle safety contact tip intact, quick-connect fitting secured with a whip check.

UNSAFE — STOP WORK



Trigger zip-tied down, safety tip removed, split taped hose — unintended discharge and hose whip.

1926.302(b)(1)-(3) • 1910.243(b) — tool secured to the hose; safety devices intact.

Extension Cords: Good vs. Bad Practice

SAFE PRACTICE



Hard-usage cord with a molded plug, fed through a GFCI and kept up off the floor.

UNSAFE — STOP WORK



Household cord with a taped splice daisy-chained into a strip lying in water.

1926.405(a)(2)(ii)(J), 1926.404(b)(1) • 1910.334(a) — hard-usage cords, GFCI protection.

Knowledge Check

Three questions. Answer out loud, then press the space bar to reveal.

Knowledge Check — Question 1 of 3

Q1. A coworker removes the lower blade guard from a circular saw because it keeps binding on the cut. What is the correct response?

A. Let them finish the cut carefully, then reinstall the guard

B. Stop the work, reinstall the guard, and tag the saw out if the guard is damaged

C. Nothing — guards may be removed for difficult cuts

D. Reduce the blade speed instead

B — Guards may never be removed or made ineffective while a tool is in use. Reinstall it; if the guard is damaged, tag the saw out of service and report it. 1926.300(b)(1)

Knowledge Check — Question 2 of 3

Q2. You need to blow metal chips off a machine table with shop air. What does OSHA require?

A. Any pressure is acceptable if you wear safety glasses

B. Under 100 psi with a face shield

C. Under 30 psi at the nozzle, with effective chip guarding and PPE

D. Compressed air may never be used for cleaning

C — Compressed air used for cleaning must be reduced to less than 30 psi at the nozzle and used only with effective chip guarding and personal protective equipment. 1910.242(b) / 1926.302(b)(4)

Knowledge Check — Question 3 of 3

Q3. A three-wire portable drill has had its grounding pin cut off so it fits an old two-slot receptacle. What is true?

A. It is acceptable if the tool is used on a GFCI circuit

B. It is acceptable with a cheater adapter

C. It is acceptable if the tool is double insulated

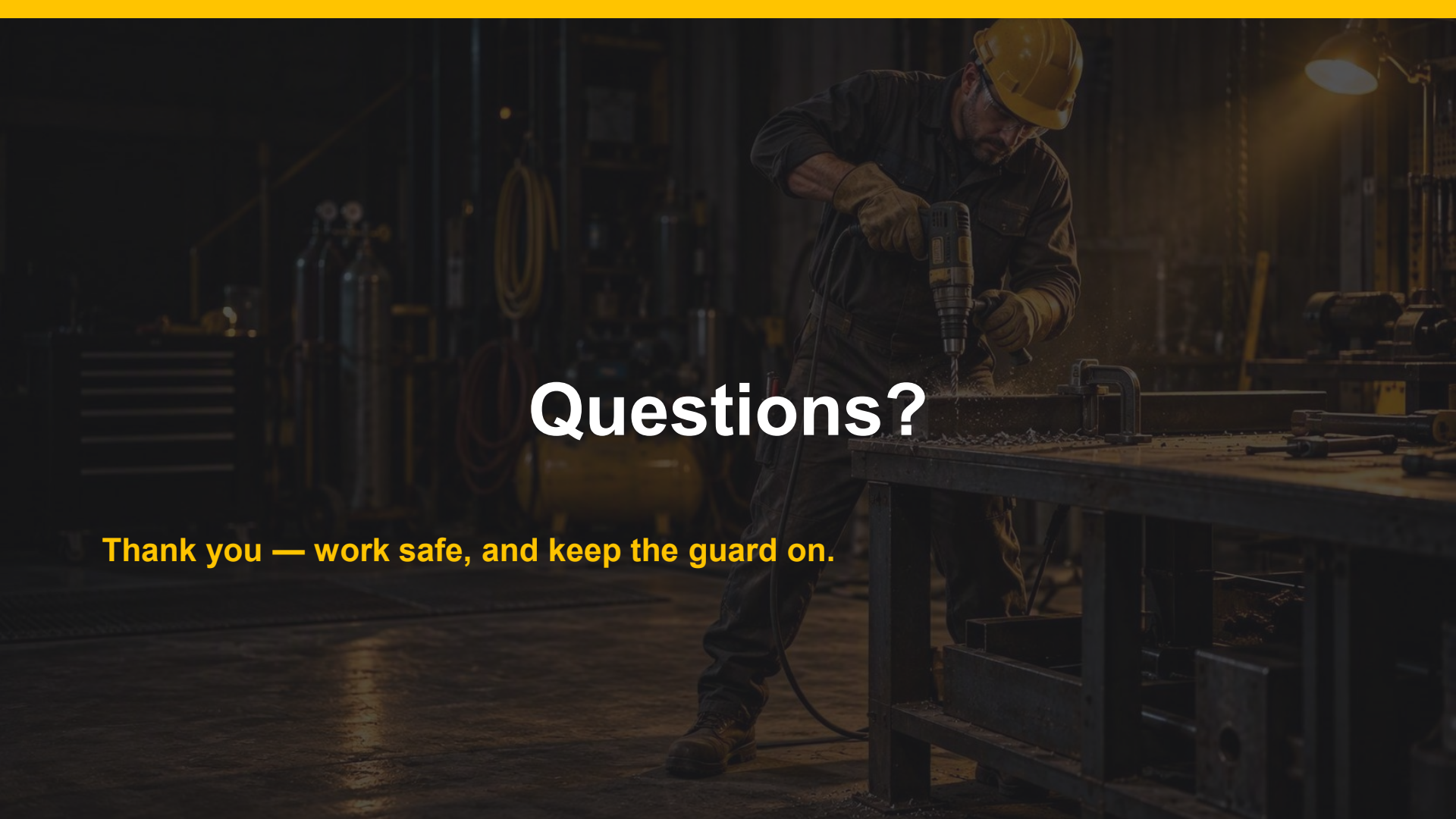
D. The tool is defective — tag it out; plugs must never be altered to defeat grounding

D — Attachment plugs must not be altered to defeat the grounding conductor. The tool is defective: remove it from service until repaired. 1910.334(a)(2)(ii) / 1926.302(a)

Ten Rules to Take Back to the Job

1. Right tool, right job — never improvise.
2. Inspect before every use; tag out defects.
3. Guards stay on. No exceptions.
4. Z87 eye protection every time, every task.
5. Face shield over glasses for grinding.
6. Never defeat a grounding pin.
7. Cords: hard-usage rated, GFCI protected.
8. Bleed air lines before clearing a jam.
9. Air for cleaning: under 30 psi with chip guarding.
10. Never clean skin or clothing with compressed air.

Questions, near misses and damaged tools go to your supervisor the same day.


Questions?
Thank you — work safe, and keep the guard on.