

EHS CONCEPTS

FIRE DOESN'T START BY ACCIDENT

The leading causes of fires in U.S. industrial and manufacturing properties, and the system fixes that stop them. A free field guide.

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Keep your people whole.

FROM RYAN

Most plant fires start with a decision

The example incidents in this letter (the bearing, the dust, the permit, the space heater) are composites to show the pattern, not reports of real events.

Most plant fires I have looked into did not start with a spark. They started weeks earlier, with a decision. The PM that slid because the line could not come down. The dust nobody was assigned to clean above eye level. The hot work permit signed from the office. The space heater someone brought in because the dock door seal was never fixed.

The data says the same thing. NFPA's latest national study of fires at U.S. industrial and manufacturing properties shows fire departments responding to an estimated 36,784 of them every year. In manufacturing structure fires, the top factor is not arson or bad luck. It is mechanical failure or malfunction, followed by failure to clean. Those are maintenance and housekeeping. Those are management systems.

For context, NFPA's newest all-property estimate, "Fire Loss in the United States During 2024" (November 2025), puts 2024 at about 1,388,000 fires, 3,920 civilian deaths, 11,780 civilian injuries, and \$19 billion in direct property damage. Structure fires were about a third of the fires but caused 81% of the deaths. The industrial study below is still NFPA's latest for plants, so its numbers stay.

That is why this guide is written for the people who own the conditions: owners, plant managers, maintenance leads, supervisors. Workers make choices inside the conditions we build. If the schedule has no room for the PM, the PM loses. If nobody's name is on the dust, the dust wins.

For each leading cause you get the pain point, what the national data says, the root causes behind it, the OSHA and NFPA requirements in plain words, controls that a small or mid-size shop can afford, a printable self-audit, and one question to start a toolbox talk.

Fire Prevention Week ran October 4 to 10 this year. The work does not stop when the week does. Pick one cause. Walk it this week. Fix what you find. Then do the next one.

Ryan L. Rinehart

Founder, EHS Concepts — The Ways of Safety

Keep your people whole.



EHS CONCEPTS
— THE WAYS OF SAFETY —

THE VERIFIED NUMBERS

Fire at U.S. industrial and manufacturing properties

36,784

fires a year at U.S. industrial or manufacturing properties (2017–2021 annual average)

\$1.5B

in direct property damage a year, plus 22 civilian deaths and 211 civilian injuries

8,077

of those are structure fires. They cause 73% of the injuries and 66% of the damage

63%

of the structure fires are in manufacturing or processing properties

39%

of structure fires start between 8 p.m. and 8 a.m. They cause 60% of the damage and 54% of the deaths

48%

of civilian deaths come from vehicle fires, which are only 10% of the incidents

Figures are NFPA national estimates, 2017–2021 annual averages, from “Fires in Industrial or Manufacturing Properties” (Tucker McGree, NFPA Research, Sept. 2023) and its Supporting Tables. This is the most recent edition NFPA has published as of October 13, 2026. “Industrial” means NFIRS property codes 600–699 (utility, defense, agriculture, mining, and other industrial). “Manufacturing” means NFIRS code 700. Cause categories come from different NFIRS fields, so one fire can count in more than one category and percentages do not add to 100. Death counts are small and should be read with caution.

The seven leading causes in this guide

	CAUSE	WHAT THE DATA SHOWS	NFPA SOURCE
1	Machines that fail, overheat, or rub	Mechanical failure is the No. 1 factor: 24% of manufacturing structure fires and 59% of the damage. Shop tools and industrial equipment are involved in 37%.	Tables 11, 12, 14
2	Failure to clean (residue, lint, dust)	No. 2 factor in manufacturing structure fires: 11%, about 557 fires a year.	Table 14
3	Electrical failure, wiring, and arcing	Electrical distribution equipment is the leading equipment in industrial-property structure fires (21%). Arcing is the heat source in 15%.	Tables 3, 4, 6
4	Heat too close to combustibles	7% of manufacturing structure fires but 14% of the injuries. Heating equipment is involved in 18%.	Tables 12, 14
5	Hot work: cutting and welding	Cutting or welding too close to combustibles: 6% of manufacturing structure fires, about 308 a year.	Table 14
6	Process heat and flammable liquids	Heat-treating equipment: 4% of manufacturing fires, 40% of the damage. Atomized liquids and aerosols: 2% of fires, 51% of the damage.	Tables 12, 17
7	Trash, waste, and outside fires	68% of all fire incidents at these properties are outside or unclassified. Contained trash fires are 10% of manufacturing and 20% of industrial structure fires.	Report; Tables 4, 12

Order follows the leading factors in NFPA's manufacturing structure-fire data, with electrical moved up because it leads in industrial properties and trash and outside fires added because they are the largest share of incidents. Supporting Tables: [NFPA Supporting Tables \(PDF\)](#).

BEFORE THE CAUSES

The four OSHA basics every plant owes its people

29 CFR 1910.39

Fire prevention plan · GI · final

Required when an OSHA standard calls for one. Must list the major fire hazards, handling and storage of hazardous materials, ignition sources and their control, and the fire protection equipment for each hazard; procedures to control flammable and combustible waste; maintenance of safeguards on heat-producing equipment; and the name or job title of the people responsible for equipment and for fuel-source hazards. Written, kept in the workplace, available to employees. Ten or fewer employees may communicate it orally. Employees are told their fire hazards on initial assignment.

29 CFR 1910.38

Emergency action plan · GI · final

Reporting procedures, evacuation and exit route assignments, critical-operations shutdown, accounting for everyone after evacuation, rescue and medical duties, and a named contact. An employee alarm system with a distinctive signal (1910.165). Designated and trained evacuation helpers. Reviewed with each employee when the plan is developed, when they are first assigned, when their duties change, and when the plan changes.

29 CFR 1910.157

Portable fire extinguishers · GI · final

Mounted, located, and identified so they are readily accessible. Fully charged and in place. Travel distance 75 ft or less for Class A, 50 ft or less for Class B. Monthly visual inspection, annual maintenance check with a record kept. If extinguishers are provided for employee use, an education program at hire and at least annually. A total-evacuation policy with a compliant EAP and FPP can change which parts apply; read 1910.157(b).

29 CFR 1910.165

Employee alarm systems · GI · final

Kept in operating condition. Non-supervised systems tested every two months. A backup means of alarm when the system is out of service.

GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Ten-minute foundation check

#	CHECK	YES	NO
1	Our fire prevention plan names our real major hazards, not a template list	☐	☐
2	Every hazard in the plan has a named owner (name or job title) who knows they own it	☐	☐
3	The EAP shows who shuts down critical equipment and how we account for every person, including contractors and visitors	☐	☐
4	The alarm can be heard in every area, including loud production areas and the yard	☐	☐
5	Extinguishers: monthly checks are current, annual service tagged, nothing blocked, right class for the hazard	☐	☐
6	Sprinkler, alarm, and detection inspection, testing, and maintenance (NFPA 25, NFPA 72) are current, with impairments tracked	☐	☐
7	Exit routes are clear and doors open from the inside without keys	☐	☐
8	We ran an evacuation drill on every shift, including nights and weekends, in the last 12 months	☐	☐

HOW TO USE THIS GUIDE

Walk it. Score it. Own it.

1. Start with the cause that matches your worst exposure, not the one at the top of the list.
2. Print the self-audit page. Walk one area, one line, or one shift. Thirty minutes.
3. Score what you can see or put your hand on, not what the binder says. If the file and the floor disagree, the file is wrong until the floor changes.
4. Every "No" gets one owner and one date before you leave the area.
5. Walk it again in 30 days. A fix that is not verified is a wish.

Spotlight: charging, batteries, and plant vehicles

THE PAIN POINT **Your forklifts, scrubbers, and cordless tools charge overnight, often in the same corner, while the building is nearly empty. (illustrative)**

This year's Fire Prevention Week theme was "Charge into Fire Safety: Safe Charging Is a Superpower," focused on lithium-ion batteries. NFPA notes it does not yet track national data on lithium-ion battery fires, so this guide makes no claim about how many plant fires they cause.

What the industrial data does show: vehicle fires are 10% of fire incidents at industrial and manufacturing properties but 48% of civilian deaths. Mechanical failure is the leading factor in those vehicle fires (36% at industrial properties, 29% at manufacturing properties), and the engine, running gear, or wheel area is where about half of them start. Structure fires that start between 8 p.m. and 8 a.m. cause 60% of structure-fire damage.

29 CFR 1910.178(g) · GI · final

Battery charging in designated areas; fire protection, ventilation, and protection of chargers from truck damage; no smoking; precautions against open flames, sparks, and arcs.

OSHA SHIB 06-20-2019 · guidance

Lithium batteries: use tested, NRTL-certified batteries and chargers rated for the use; follow the maker's charging instructions; remove from the charger when full; inspect for bulging, cracking, hissing, leaking, heat, or smoke and remove damaged units to a safe area; include battery-failure response in the EAP.

- ☐ Charging happens in a designated area with clearance from combustibles and storage
- ☐ Only manufacturer-approved chargers are in use; no daisy-chained power strips
- ☐ Damaged, swollen, or dropped batteries have a defined quarantine spot away from combustibles
- ☐ Overnight charging areas are covered by detection or sprinklers, and the alarm reaches someone
- ☐ Daily pre-use checks on trucks include leaks, wiring, and the engine or motor compartment

USE THIS EVERY TIME

When you find a gap: the eight-step response

1. Stop or contain.	If the gap is live (hot work without a fire watch, a smoking motor, dust layered on a hot surface, a blocked exit), stop that task now. Anyone can call it. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.
2. Remove the fuel or the heat first.	Clean it, move it, shut it down, or guard it. Then fix the paperwork so it says what is true.
3. Find the decision that allowed it.	Ask what made the condition normal: a deferred PM, no cleaning owner, a production target, a missing budget line, a contractor nobody briefed. Do not stop at “they should have known.”
4. One owner. One date.	One name, not a department. One date, not “ASAP.”
5. Verify in the field.	The owner shows the fix on the floor. Re-check in 30 days.
6. Look sideways.	If it is on one line or one shift, check the others this week.
7. Protect the person who raised it.	Thank them and tell them what changed. Retaliation for reporting a hazard is illegal under Section 11(c) of the OSH Act.
8. Get help when you need it.	OSHA's On-Site Consultation Program is free, confidential, and separate from enforcement for small and mid-size employers (osha.gov/consultation). Your insurer's loss-control staff and your local fire marshal are also free resources.

Leaders own the conditions. Workers make choices inside the conditions we build. When a gap shows up, the first question is not “who did it?” It is “what did we build, fund, schedule, or tolerate that made this normal?”

This guide is a practical summary for planning and self-audit. It is not legal advice and does not replace the text of OSHA standards, NFPA codes, your insurer's requirements, or the codes your authority having jurisdiction (AHJ) has adopted. State-plan states may have different or additional rules. NFPA code editions vary by jurisdiction; check which edition applies to you. Regulatory text is paraphrased. When this guide and a regulation disagree, the regulation controls.

01

Machines that fail, overheat, or rub

1910.39(c)(3)–(4) [GI] · General Duty Clause · NFPA 70B · maker's manuals

24%

of manufacturing structure fires:
mechanical failure or malfunction, the
No. 1 factor

59%

of the property damage in those fires

37%

involve shop tools or industrial
equipment

THE PAIN POINT The bearing has been squealing for two weeks. Everyone hears it. The PM is “scheduled for the next shutdown.” (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). Mechanical failure or malfunction is the leading factor contributing to ignition in manufacturing structure fires: about 1,261 fires a year, 24% of the total, and \$509 million (59%) of the direct damage. It also leads in industrial properties (17%). Shop tools and industrial equipment are involved in 37% of manufacturing structure fires, 49% of the civilian injuries, and 69% of the damage. Heat from powered equipment (20%), radiated or conducted heat from operating equipment (17%), and friction heat (6%) are among the leading heat sources. NFPA Supporting Tables 11, 12, 14, 15.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Preventive maintenance is the first thing cut when production is behind. Deferred PM is a decision, even when nobody writes it down.
- Nobody owns the warning signs. Heat, noise, smell, vibration, and a tripped breaker get reset, not reported.
- Run-to-failure is the unwritten strategy for older equipment, and nobody has priced what a fire costs compared to a bearing.
- Guards, shrouds, and covers that came off for a repair trap dust and oil, or never went back on.
- Maintenance and operations keep separate lists, so a machine everyone knows is sick still runs a third shift.
- Lubrication is by habit, not by schedule, and the wrong grease or a dry bearing turns into friction heat.

REQUIREMENTS AND CONTROLS · MACHINES THAT FAIL, OVERHEAT, OR RUB

What the rules require, in plain words

1910.39(c)(3) · GI · final	The fire prevention plan must include procedures for regular maintenance of safeguards on heat-producing equipment, to prevent accidental ignition of combustibles.
1910.39(c)(4) · GI · final	It must name (name or job title) the people responsible for maintaining equipment that prevents or controls ignition sources.
OSH Act 5(a)(1) · statute	The General Duty Clause covers recognized fire hazards with feasible fixes even where no specific standard applies.
NFPA 70B	A documented electrical maintenance program for motors, drives, and controls. Your insurer may already require it.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate	Retire or replace the machine with a fire history. Choose equipment with thermal overload protection and enclosed drives when you buy.
Engineer	Bearing temperature or vibration sensors on critical drives. Thermal overloads and interlocks that shut down on overheating. Spark and heat detection in dust-collection ductwork.
Administrative	A PM schedule that production cannot defer without a named manager signing for the risk. A simple “heat, noise, smell, smoke” report card at every line. Infrared scans on motors and drives once a year or more.
Housekeeping	Clean around motors, belts, and drives on a schedule tied to the PM, not “when it looks bad.”
Small-shop fix	A \$50 infrared thermometer, a laminated temperature log on the three machines that worry you most, and a rule that any reading over the maker's limit gets a work order that day.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

01 · Machines that fail, overheat, or rub

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	Every critical machine has a current PM. None are overdue more than 30 days	☐	☐	☐	
2	Any deferred PM has a named manager who signed for the risk and a new date	☐	☐	☐	
3	No motor, bearing, or drive is noticeably hot, loud, or smoking right now	☐	☐	☐	
4	Guards, shrouds, and covers are in place and free of packed dust or oil	☐	☐	☐	
5	Belts are tracking and tensioned; no glazing, fraying, or rubbing on guards	☐	☐	☐	
6	Lubrication follows a written schedule with the right lubricant	☐	☐	☐	
7	Operators can say how they report heat, noise, smell, or smoke, and to whom	☐	☐	☐	
8	The last three operator reports got a work order, not a shrug	☐	☐	☐	
9	Thermal overloads and interlocks are not bypassed or jumpered	☐	☐	☐	
10	An extinguisher of the right class is within reach and inspected this month	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any “No” that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · MACHINES THAT FAIL, OVERHEAT, OR RUB

Who owns it

Owner / plant manager	Funds PM and protects downtime for it. Signs for any deferral.
Maintenance lead	PM schedule, infrared scans, lubrication program, overload settings.
Supervisor	Acts on operator reports the same shift. Takes a sick machine down.
Operators	Report heat, noise, smell, vibration, smoke. Have the right to stop.
Safety lead	Audits, trends, and keeps the fire prevention plan honest.

How to verify it is working on the floor

- Pull the PM backlog for the top 10 machines. Count overdue items and who approved each one.
- Shoot an infrared reading on three drives during production. Compare with the last scan.
- Ask an operator: what was the last thing you reported, and what happened next?

TOOLBOX TALK STARTER

Which machine in this area would you bet catches fire first, and what have you already told someone about it?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Lock out the machine if it is hot or smoking. Write the work order before you leave. Ask what made the deferral normal. Then run the gap response on page 6.

Failure to clean: residue, lint, and dust

1910.22(a)(1) [GI] · 1910.176(c) [GI] · 1910.39(c)(2) [GI] · Combustible Dust NEP CPL 03-00-008 · NFPA

11%

of manufacturing structure fires:
failure to clean, the No. 2 factor

~557

fires a year

119

worker deaths in 281 dust fires and
explosions, 1980–2005 (CSB)

THE PAIN POINT Look up. The dust on the beams, light fixtures, and duct tops has been there since before your newest hire was hired. (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). Failure to clean is the second leading factor contributing to ignition in manufacturing structure fires: about 557 fires a year, 11% of the total (NFPA Supporting Table 14). Combustible dust is not a separate NFIRS cause code, so national fire data does not show its full size. The U.S. Chemical Safety Board identified 281 combustible dust fires and explosions in U.S. industry from 1980 to 2005, which killed 119 workers and injured 718. OSHA has run a Combustible Dust National Emphasis Program since 2007 and reissued it on Jan. 30, 2023. OSHA says it has averaged about 600 inspections a year under the program.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Cleaning is “everybody’s job,” so it is nobody’s. There is no name and no frequency on the task.
- The cleaning schedule covers the floor people walk on, not the overhead surfaces where dust settles and waits.
- Compressed air is the fastest tool, so dust gets blown into the air and onto the next ledge instead of removed.
- Dust collectors, filters, and ductwork are maintained on paper only, and nobody opens them.
- Nobody has tested the dust, so nobody knows it is combustible, so nobody plans for it.
- Night and weekend crews are thin, and cleaning is the first thing dropped.

REQUIREMENTS AND CONTROLS · FAILURE TO CLEAN: RESIDUE, LINT, AND DUST

What the rules require, in plain words

1910.22(a)(1) · GI · final	Workplaces, passageways, storerooms, and service rooms kept clean and orderly.
1910.176(c) · GI · final	Storage areas kept free of accumulations that create fire or explosion hazards.
1910.39(c)(2) · GI · final	The fire prevention plan must have procedures to control accumulations of flammable and combustible waste.
1910.106(e)(9)(iii) · GI · final	Where flammable liquids are used, combustible waste and residue kept to a minimum, stored in covered metal containers, and disposed of daily.
CPL 03-00-008 · OSHA directive, in effect	OSHA's Combustible Dust NEP. Inspectors look at housekeeping, dust collection, ignition control, and hazardous-location electrical (1910.307 [GI]). Grain operations also fall under 1910.272 [GI].
NFPA 660 (2025) · final	Consolidates NFPA 61, 484, 652, 654, 655, and 664. Calls for a dust hazard analysis (DHA) and housekeeping, ignition control, and protection based on it.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate / substitute	Capture dust at the source so it never reaches the rafters. Wet methods where the process allows.
Engineer	Properly designed and maintained dust collection; collectors outside or protected; spark detection where sparks can reach the collector. Seal or slope ledges so dust cannot settle.
Administrative	A written cleaning schedule with surfaces, frequency, method, and a named owner per area, including overhead. Test the dust if you do not know whether it is combustible. Do a dust hazard analysis.
Methods	Vacuums rated for combustible dust instead of compressed air or dry sweeping. If compressed air is the only option, shut down ignition sources and limit the area first.
Small-shop fix	One overhead clean-down a quarter, on the calendar, with a lift booked and a name assigned. Then set the interval by what you find.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

02 · Failure to clean: residue, lint, and dust

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	Overhead surfaces (beams, ducts, light fixtures) are free of visible dust layers	☐	☐	☐	
2	The cleaning schedule names surfaces, frequency, method, and one owner per area	☐	☐	☐	
3	Cleaning is done with suitable vacuums, not compressed air or dry sweeping	☐	☐	☐	
4	Dust collectors and filters are on a PM, and the last service date is current	☐	☐	☐	
5	Ductwork and hoods were opened and checked inside in the last year	☐	☐	☐	
6	We know whether our dust is combustible (test result on file or SDS reviewed)	☐	☐	☐	
7	A dust hazard analysis has been done or scheduled for dust-producing processes	☐	☐	☐	
8	Oily rags go in a covered metal can that is emptied daily	☐	☐	☐	
9	Lint, shavings, and scrap do not build up on or under machines	☐	☐	☐	
10	Night and weekend shifts have the same cleaning tasks and someone checks them	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any “No” that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · FAILURE TO CLEAN: RESIDUE, LINT, AND DUST

Who owns it

Owner / plant manager	Funds dust collection, lift time, and testing. Treats housekeeping as production work.
Area supervisor	Owens the cleaning schedule for the area and checks it every shift.
Maintenance	Dust collectors, filters, ductwork, ignition control in dusty areas.
Every worker	Cleans as part of the job and reports buildup they cannot reach.
Safety lead	Dust testing, DHA, NEP readiness, audits.

How to verify it is working on the floor

- Wipe a gloved finger along the top of the highest beam you can reach safely. Photograph it.
- Open the cleaning log for last weekend. Check that the tasks were done, not just signed.
- Ask: if this dust lit, where would the fire go next?

TOOLBOX TALK STARTER

If we turned on a leaf blower in here right now, what would come down from the ceiling, and would it burn?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Shut down ignition sources near heavy accumulations and clean with the right method. Then put a name and a frequency on that surface. Then run the gap response on page 6.

03

Electrical failure, wiring, and arcing

1910.303(b)(1) [GI] · 1910.303(g)(1) [GI] · 1910.305(g)(1)(iv) [GI] · NFPA 70 · NFPA 70B · NFPA 70E

21%

of industrial-property structure fires: electrical distribution, lighting, and power transfer equipment, the leading equipment

12%

wiring and related equipment alone

15%

of industrial structure fires: arcing as the heat source

THE PAIN POINT Behind the line there is an extension cord feeding a power strip feeding a fan. It has been “temporary” for three years. (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). In industrial properties, electrical distribution, lighting, and power transfer equipment is the leading equipment involved in ignition: 21% of structure fires. Wiring and related equipment alone accounts for 12% of the fires and 13% of the injuries. Arcing is the heat source in 15%, and electrical failure or malfunction is a contributing factor in 13%. Electrical wire or cable insulation is the first item ignited in 9% of industrial fires and 11% of the damage. In manufacturing properties, electrical failure is a factor in 8% of structure fires (about 411 a year). NFPA report and Supporting Tables 3, 4, 6, 14.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Temporary wiring becomes permanent because nobody owns removing it.
- Panels become storage shelves, so the working space disappears and nobody can see a hot breaker.
- Electrical PM is reactive: fix it when it trips. Loose connections heat for months first.
- Adds and moves are done by whoever is available, not by a qualified person, and not to code.
- Equipment is not rated for the environment: dust, moisture, oil mist, or vibration chew through it.
- A thermal scan is seen as a cost, not as the cheapest fire inspection you can buy.

REQUIREMENTS AND CONTROLS · ELECTRICAL FAILURE, WIRING, AND ARCING

What the rules require, in plain words

1910.303(b)(1) · GI · final	Electrical equipment must be free from recognized hazards likely to cause death or serious harm. Listing or labeling helps show suitability.
1910.303(b)(6) · GI · final	Unless identified for the environment, equipment must not be located where damp, corrosive, or excessive heat conditions deteriorate it.
1910.303(g)(1) · GI · final	Working space kept clear around electrical equipment, at least 30 in. wide, so it can be safely operated and maintained.
1910.305(g)(1)(iv) · GI · final	Flexible cords may not substitute for fixed wiring, run through walls, ceilings, floors, doorways, or windows, or be attached to building surfaces (with listed exceptions).
NFPA 70 / 70B / 70E	NFPA 70 (National Electrical Code) for installation. NFPA 70B for an electrical maintenance program. NFPA 70E for safe work on or near energized equipment.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate	Replace extension cords and power strips with permanent outlets where the equipment actually is.
Engineer	Correctly rated enclosures for dusty or wet areas. AFCI or GFCI protection where appropriate. Classified-location equipment where flammable vapors or combustible dust are present (1910.307 [GI]).
Administrative	A yearly infrared scan of panels, switchgear, and MCCs by a qualified contractor, with the findings closed out. A “no temporary over 90 days” rule with a named owner.
Housekeeping	Mark a 36 in. clear zone in front of panels on the floor and keep it empty. Covers on, knockouts closed.
Small-shop fix	Walk every panel this week with the electrician. Clear the space, close the openings, list every cord used as fixed wiring, and price the fixes.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

03 · Electrical failure, wiring, and arcing

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	Panels and disconnects have clear working space; nothing stored in front	☐	☐	☐	
2	Panel covers on, unused openings closed, circuits labeled	☐	☐	☐	
3	No extension cords used as permanent wiring or run through walls, ceilings, or doors	☐	☐	☐	
4	No daisy-chained power strips or cords	☐	☐	☐	
5	Cords and plugs are undamaged; no exposed conductors or taped splices on light cords	☐	☐	☐	
6	No warm, discolored, buzzing, or burning-smelling outlets, breakers, or panels	☐	☐	☐	
7	An infrared scan was done in the last 12 months and its findings are closed	☐	☐	☐	
8	Electrical equipment in dusty, wet, or vapor areas is rated for that location	☐	☐	☐	
9	Only qualified people make electrical changes, and changes are documented	☐	☐	☐	
10	Lights and fixtures are not in contact with combustibles or packed with dust	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any “No” that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · ELECTRICAL FAILURE, WIRING, AND ARCING

Who owns it

Owner / plant manager	Budget for scans and for retiring temporary wiring.
Maintenance / electrician	Scans, repairs, qualified work, classified-location equipment.
Supervisor	Keeps panel space clear. Reports tripping breakers and hot cords.
Every worker	Reports damaged cords and hot or buzzing equipment. Does not do their own wiring.
Safety lead	Audits, temporary-wiring list, NFPA 70E program coordination.

How to verify it is working on the floor

- Count the extension cords in one area. Ask who owns each and when it goes away.
- Open last year's infrared report. How many findings are still open?
- Put your hand near (not on) the cord feeding the busiest machine. Is it warm?

TOOLBOX TALK STARTER

Show me a cord in this area that has been “temporary” longer than you have been here.

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

De-energize and remove damaged cords or hot equipment now. Assign a permanent fix with a date. Then run the gap response on page 6.

04 Heat too close to combustibles

1910.39(c)(1), (c)(3) [GI] · 1910.176(c) [GI] · NFPA 1 Fire Code · maker's clearances

7%

of manufacturing structure fires, but
14% of the injuries

18%

of manufacturing structure fires
involve heating equipment

9%

of industrial structure fires; linked to
the one average civilian death a year
in those fires

THE PAIN POINT It is cold on the dock, so there is a space heater under the desk, two feet from a stack of cardboard. (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). A heat source too close to combustibles is a factor in 7% of manufacturing structure fires (about 358 a year) but 14% of the civilian injuries. In industrial properties it is 9% of structure fires and accounts for the single average civilian death a year in those fires. Heating equipment is involved in 18% of manufacturing structure fires. Space heaters are 3% of those fires but 9% of the injuries. Heat lamps are 6% of industrial structure fires. Radiated or conducted heat from operating equipment is the heat source in 17% of manufacturing structure fires. NFPA Supporting Tables 4, 6, 12, 14, 15. Small death counts; read with caution.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Building comfort problems (bad door seals, broken heaters) get solved with personal space heaters instead of repairs.
- Storage creeps. Pallets, cardboard, and packaging drift toward ovens, dryers, heaters, and lights a little each week.
- Clearances are in the maker's manual, which nobody on the floor has seen.
- Process heat (dryers, heat-sealers, hot glue, heat lamps) is normal, so nobody sees it as an ignition source.
- Equipment is left on at shift end, and the fire starts when the building is empty.

REQUIREMENTS AND CONTROLS · HEAT TOO CLOSE TO COMBUSTIBLES

What the rules require, in plain words

1910.39(c)(1) · GI · final	The fire prevention plan lists potential ignition sources and their control, and the major fire hazards and how materials are stored.
1910.39(c)(3) · GI · final	Regular maintenance of safeguards on heat-producing equipment to prevent accidental ignition.
1910.176(c) · GI · final	Storage areas free of accumulations that create fire hazards.
NFPA 1 / AHJ	Your adopted fire code and the manufacturer's listing set clearances to combustibles for heaters and heat-producing equipment.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate	Fix the building: door seals, dock curtains, unit heaters. Then the personal heaters have no reason to exist.
Engineer	Where portable heaters are allowed, approved units only, with tip-over and overheat shutoff, plugged directly into the wall. Guards on heat lamps and hot surfaces. Timers or interlocks so heat sources shut off at shift end.
Administrative	A short list of approved heaters and where they may be used. Painted no-storage zones around ovens, dryers, heaters, and lights. End-of-shift shutdown check.
Housekeeping	Clearances checked weekly by the area owner, not once a year by the safety lead.
Small-shop fix	Count every portable heater in the building this week. Remove the ones that are not approved. Fix the reason each one was there.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

04 · Heat too close to combustibles

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	No personal space heaters except approved units on the approved list	☐	☐	☐	
2	Approved heaters plug directly into a wall outlet, not a cord or power strip	☐	☐	☐	
3	Heaters, ovens, dryers, and heat lamps have marked clearances, and nothing is stored inside them	☐	☐	☐	
4	Lights and fixtures are not touching storage, packaging, or racking	☐	☐	☐	
5	Hot process surfaces have guards and are clear of rags, paper, and plastic	☐	☐	☐	
6	Pallets and cardboard are stored away from heat sources and building heaters	☐	☐	☐	
7	Shift-end shutdown of heat-producing equipment is assigned and checked	☐	☐	☐	
8	Maker's clearances for heat-producing equipment are posted at the equipment	☐	☐	☐	
9	Recurring cold spots (docks, doors, offices) have a building repair ticket open	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any "No" that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · HEAT TOO CLOSE TO COMBUSTIBLES

Who owns it

Owner / plant manager	Funds building heating fixes so people stop improvising.
Facilities / maintenance	Approved heater list, guards, timers, building repairs.
Supervisor	Clearances and shift-end shutdowns in their area.
Every worker	Uses only approved heaters. Reports storage creep.
Safety lead	Audits and keeps the ignition-source list in the fire prevention plan current.

How to verify it is working on the floor

- Walk the building at shift end and count heat sources left on.
- Measure the gap between the nearest storage and each oven or dryer. Compare to the marked zone.
- Ask the dock crew where they get warm.

TOOLBOX TALK STARTER

If we turned off every heater in this building tonight, which one would you miss, and why are we heating that spot with a portable?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Unplug and remove unapproved heaters now. Move storage back. Open a repair ticket for the reason the heater was there. Then run the gap response on page 6.

05

Hot work: cutting and welding

1910.252(a) [GI] · NFPA 51B (2024) · Construction: 1926.352

6%

of manufacturing structure fires:
cutting or welding too close to
combustibles

~308

fires a year

35 ft

the distance OSHA uses for
combustibles, sweeping, and fire
watch triggers

THE PAIN POINT **A contractor is grinding on a mezzanine. The permit was signed in the office. Nobody looked below.** (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). Cutting or welding too close to combustibles is a factor in 6% of manufacturing structure fires, about 308 a year (NFPA Supporting Table 14). Welding torches and torches, burners, or soldering irons are each involved in about 2% of manufacturing structure fires. Sparks, embers, or flames from operating equipment are the heat source in 16% of manufacturing structure fires and 53% of the damage. That category includes more than hot work, but it shows how costly sparks can be.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- The permit is signed from a desk. The person authorizing it never sees the area.
- Contractors are assumed to know your plant. They do not know where your dust, foam, or flammables are.
- The fire watch is the welder's helper, who is also holding the work. Or the watch leaves when the welding stops.
- Sprinkler impairments are not coordinated with hot work.
- Grinding is not treated as hot work, even though it throws sparks just as far.
- “It's a quick tack weld” becomes the exception that happens every week.

REQUIREMENTS AND CONTROLS · HOT WORK: CUTTING AND WELDING

What the rules require, in plain words

1910.252(a)(1) · GI · final	Move the work or move the fire hazards. If neither is possible, use guards. If you cannot do either, do not weld or cut.
1910.252(a)(2)(iii) · GI · final	Fire watch required where more than a minor fire could develop, including appreciable combustibles within 35 ft. The watch has an extinguisher, is trained, can sound the alarm, and stays at least 30 minutes after the work ends. NFPA 51B (2024) sets 1 hour.
1910.252(a)(2)(iv) · GI · final	Before work, the area is inspected by the person responsible for authorizing it, who sets the precautions, preferably in a written permit.
1910.252(a)(2)(vi) · GI · final	No hot work in sprinklered buildings while protection is impaired, in explosive atmospheres, or in areas management has not authorized.
1910.252(a)(2)(xiii) · GI · final	Management must recognize its responsibility, set hot work areas and procedures, designate the person who authorizes it, make sure welders and their supervisors are trained, and advise contractors about flammables and hazards they may not know about.
NFPA 51B (2024) · final	Fire watch 1 hour after hot work (the permit authorizer may cut it to 30 min or extend it), plus monitoring up to 3 more hours as the authorizer decides (NFPA 51B 2024 sec. 5.6). OSHA's 30 minutes in 1910.252 is the legal floor; your insurer may require the NFPA 51B time.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate	Can the part come to a designated hot work area or be joined cold (bolting, clamping, mechanical fittings)?
Engineer	Designated hot work booths or areas. Welding blankets and curtains. Cover floor and wall openings so sparks cannot drop through.
Administrative	Hot work permit signed at the work site by a trained authorizer. Contractor briefing on your hazards. Fire watch with no other duties, through breaks and for the full time after.
Housekeeping	Sweep and clear combustibles 35 ft out, or cover them with fire-resistant covers. Shut down or protect ducts and conveyors that could carry sparks.
Small-shop fix	One-page permit, one trained authorizer per shift, a hot work kit (blankets, extinguisher, timer) on a cart that goes with the job.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

05 · Hot work: cutting and welding

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	A permit is posted at the job, signed by an authorizer who inspected the area	☐	☐	☐	
2	Combustibles within 35 ft are removed or covered with fire-resistant covers	☐	☐	☐	
3	Floor and wall openings within 35 ft are covered or blocked	☐	☐	☐	
4	Sprinklers are in service (no impairment) in the work area	☐	☐	☐	
5	No flammable vapors or dust accumulations in the area; ducts and conveyors protected	☐	☐	☐	
6	A fire watch with no other duties is present with a charged extinguisher	☐	☐	☐	
7	The fire watch knows how to sound the alarm and stays at least 30 minutes after (OSHA), 1 hour under NFPA 51B	☐	☐	☐	
8	The other side of walls, floors, and ceilings has been checked	☐	☐	☐	
9	Contractors were briefed on your hazards and are on your permit, not only theirs	☐	☐	☐	
10	Grinding and torch work are covered by the permit, not just welding	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any "No" that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · HOT WORK: CUTTING AND WELDING

Who owns it

Owner / plant manager	Sets hot work areas and procedures. Designates the authorizer. Owns contractor control.
Authorizer	Inspects the site, sets precautions, signs the permit at the work site.
Supervisor / contractor lead	Keeps the conditions in place while the work runs.
Fire watch	Watches, extinguishes small fires, sounds the alarm, stays the full time.
Safety lead	Trains authorizers and fire watches, audits permits.

How to verify it is working on the floor

- Pull three recent permits. Were they signed at the job? Did someone check the floor below?
- Ask a fire watch what they would do if a fire was bigger than the extinguisher.
- Check the time on the last permit closeout against the end of the work.

TOOLBOX TALK STARTER

Where would a spark from this job land if it went through that gap, and who is standing there to see it?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Stop the hot work. Clear or cover the combustibles and post a fire watch before restarting. Then run the gap response on page 6.

06 Process heat and flammable liquids

1910.106 [GI] · 1910.107 [GI] · Construction: 1926.152 · NFPA 86 · NFPA 30 · NFPA 33

40%

of manufacturing fire damage involves heat-treating equipment, which is only 4% of fires

51%

of the damage: atomized or vaporized liquids and aerosols first ignited, 2% of fires

16%

of injuries: flammable or combustible liquids or gases first ignited, 3% of fires

THE PAIN POINT The oven's safety interlock has been jumpered since the last breakdown, because restarting it the right way takes too long. (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). Heat-treating equipment is involved in only 4% of manufacturing structure fires but \$325 million, or 40%, of the damage. Industrial furnaces and kilns are 3% of those fires, and NFPA attributes the small number of average civilian deaths in manufacturing structure fires to them. Atomized or vaporized liquids and aerosols are the first item ignited in 2% of fires but 51% (\$413 million) of the damage. Flammable or combustible liquids, gases, filters, or piping are first ignited in 3% of fires but 16% of the injuries. NFPA Supporting Tables 12 and 17. Small death counts; read with caution.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Burner management and combustion safeguards are bypassed to keep a line running, then left that way.
- Ovens and furnaces are inspected when they fail, not on a schedule.
- Flammable liquids live at the workstation in open containers because walking to the cabinet takes time.
- Transfer and dispensing happen without bonding and grounding.
- Spray areas and booths collect overspray residue that nobody owns cleaning.
- Process changes (new solvent, new coating, higher temperature) are not reviewed for fire risk.

REQUIREMENTS AND CONTROLS · PROCESS HEAT AND FLAMMABLE LIQUIDS

What the rules require, in plain words

1910.106(e)(2)(ii)(b) · GI · final	In plants where flammable liquids are incidental, the amount outside a storage room or cabinet in one fire area is limited: 25 gal of Category 1, 120 gal of Category 2–4 in containers, 660 gal in one portable tank.
1910.106(d)(3) · GI · final	A storage cabinet may hold no more than 60 gal of Category 1–3 or 120 gal of Category 4 liquids.
1910.106(e)(2)(iv) · GI · final	Category 1 and 2 liquids (and Category 3 below 100 °F flashpoint) kept in covered containers when not in use.
1910.106(e)(6) · GI · final	Control ignition sources where vapors may be present. Bond nozzle and container when dispensing Category 1, 2, and low-flashpoint Category 3 liquids.
1910.107 · GI · final	Spray finishing: booth construction, ventilation, electrical, and cleaning of residue.
NFPA 86 / 30 / 33	NFPA 86 for ovens and furnaces, including safety device testing. NFPA 30 for flammable liquids. NFPA 33 for spray application.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate / substitute	Use a higher-flashpoint or water-based product. Reduce quantities at the point of use.
Engineer	Combustion safeguards and interlocks that are tested and cannot be bypassed without a permit. Safety cans and approved cabinets. Bonding and grounding at dispensing. Ventilation and suppression in booths and over quench tanks.
Administrative	Bypass permit: any defeated safety device gets a manager's signature, a tag, and a time limit. Annual safety-device testing on ovens and furnaces by a qualified person. Management-of-change review for new chemicals or temperatures.
Housekeeping	Clean overspray and residue on a schedule. Waste solvent and rags in closed metal containers, emptied daily.
Small-shop fix	Count the gallons outside your cabinets this week. Get the number under the limits. Tag every jumper on every oven and furnace and decide each one.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

06 · Process heat and flammable liquids

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	No safety interlocks or combustion safeguards are bypassed or jumpered	☐	☐	☐	
2	Any bypass in place has a written permit, a tag, and a removal date	☐	☐	☐	
3	Oven and furnace safety devices were tested in the last 12 months	☐	☐	☐	
4	Flammable liquids outside cabinets are within limits and in closed, labeled containers	☐	☐	☐	
5	Storage cabinets are labeled, closed, and not overfilled	☐	☐	☐	
6	Bonding and grounding are used when dispensing flammable liquids	☐	☐	☐	
7	Spray booths and quench areas are clean of residue and have working ventilation	☐	☐	☐	
8	No ignition sources (open flame, non-rated electrical, grinding) near vapor areas	☐	☐	☐	
9	Waste solvent and rags are in closed metal containers	☐	☐	☐	
10	New chemicals or process changes got a fire-risk review before use	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any "No" that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · PROCESS HEAT AND FLAMMABLE LIQUIDS

Who owns it

Owner / plant manager	Bans unpermitted bypasses. Funds safeguard testing and substitution.
Maintenance / process engineering	Safety device testing, bonding, ventilation, management of change.
Supervisor	Point-of-use quantities, closed containers, bypass tags.
Operators	Report bypasses and leaks. Use cans, cabinets, and bonding.
Safety lead	Audits, SDS review, flammable inventory, insurer liaison.

How to verify it is working on the floor

- Walk every oven and furnace with maintenance and look for jumpers. Count them.
- Add up gallons outside cabinets in one fire area.
- Watch one dispensing operation. Is the bond wire connected?

TOOLBOX TALK STARTER

What safety device in this area have we gotten used to working around?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Take the equipment out of service until the safeguard works or a permitted bypass is in place. Remove excess flammables to storage. Then run the gap response on page 6.

07

Trash, waste, and outside fires

1910.39(c)(2) [GI] · 1910.106(e)(9) [GI] · 1910.176(c) [GI] · NFPA 1 / local fire code

68%

of all fire incidents at these properties are outside or unclassified fires

20%

of industrial structure fires are contained trash or rubbish fires (10% in manufacturing)

11%

of industrial structure fires: rubbish, trash, or waste first ignited, and 11% of injuries

THE PAIN POINT The dumpster is against the building, under the eave, next to the pallet stack. (illustrative)

What the national data says

NFPA data, 2017–2021 averages (latest edition). Outside and unclassified fires make up 68% of the fire incidents at industrial and manufacturing properties, about 25,021 a year. They cause a smaller share of the losses (28% of civilian deaths, 14% of injuries, 25% of damage), but they are where fires start and spread to buildings. Contained trash or rubbish fires are 20% of industrial and 10% of manufacturing structure fires. Rubbish, trash, or waste is the leading item first ignited in industrial fires (11% of fires, 11% of injuries). Abandoned or discarded materials are a factor in 5% of manufacturing structure fires; compactor and incinerator fires are about 4% each. NFPA report and Supporting Tables 4, 9, 12, 14.

Why it really happens

Not “worker carelessness.” These are the system and leadership conditions that make this fire predictable.

- Waste removal is a cost to cut, so pickups get stretched and bins overflow.
- Dumpsters, pallet stacks, and scrap sit against the building because it is closer.
- Hot or reactive waste (hot slag, oily rags, swarf, batteries) goes in the general trash.
- Smoking areas are wherever people choose, often next to the bin.
- The yard belongs to nobody. Weeds, pallets, and scrap grow until someone complains.

REQUIREMENTS AND CONTROLS · TRASH, WASTE, AND OUTSIDE FIRES

What the rules require, in plain words

1910.39(c)(2) · GI · final	The fire prevention plan includes procedures to control accumulations of flammable and combustible waste.
1910.106(e)(9)(iii)–(iv) · GI · final	Where flammable liquids are used: combustible waste in covered metal containers, disposed of daily; grounds kept free of weeds, trash, and unnecessary combustibles.
1910.176(c) · GI · final	Storage areas free of accumulations that create fire hazards; vegetation controlled.
NFPA 1 / AHJ	Your adopted fire code sets separation of dumpsters and outdoor storage from buildings. Ask your fire marshal.

Paraphrased. OSHA text checked on eCFR Oct. 13, 2026. NFPA codes apply as adopted by your AHJ or required by your insurer. GI = general industry (29 CFR 1910). Every OSHA standard cited in this guide is a final GI rule. Construction has its own rules: 1926.150 (fire protection), 1926.151 (fire prevention), 1926.152 (flammable liquids), 1926.352 (fire prevention in welding and cutting), and Subpart K (electrical).

Controls that work, in hierarchy order

Eliminate	Reduce waste at the source. Return pallets and packaging to suppliers.
Engineer	Metal, lidded containers. Dumpsters and pallet storage moved away from walls, openings, and eaves. Self-closing oily-waste cans.
Administrative	Pickup frequency set by volume, not by the cheapest contract. A separate path for hot, oily, or reactive waste and damaged batteries. Designated smoking area away from waste and combustibles.
Housekeeping	A named yard owner and a weekly yard walk.
Small-shop fix	Measure the distance from each dumpster and pallet stack to the building. Call your fire marshal and ask what yours should be. Move them.

Leaders own the conditions. If the control only works when someone is willing to argue with the schedule, it is not a control. Build it so the safe way is the normal way.

30-MINUTE SELF-AUDIT · PRINT AND TAKE TO THE FLOOR

07 · Trash, waste, and outside fires

SITE	AREA / LINE / SHIFT	AUDITOR	DATE
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#	CHECK WHAT YOU CAN SEE OR PUT YOUR HAND ON	YES	NO	N/A	NOTES
1	Dumpsters and compactors are away from walls, openings, and eaves per the local fire code	☐	☐	☐	
2	Pallet and scrap stacks are away from the building and kept to a set height	☐	☐	☐	
3	Waste containers are lidded and not overflowing	☐	☐	☐	
4	Oily rags and solvent waste go in self-closing metal cans, emptied daily	☐	☐	☐	
5	Hot slag, swarf, and damaged batteries never go in general trash	☐	☐	☐	
6	Smoking is only in the designated area, with a proper receptacle	☐	☐	☐	
7	The yard and fence line are free of weeds, trash, and unneeded combustibles	☐	☐	☐	
8	Compactors and balers are on a PM and their area is clean	☐	☐	☐	
9	Waste pickup is frequent enough that bins are not full before pickup	☐	☐	☐	
10	Someone is named to own the yard and walks it weekly	☐	☐	☐	

#	GAP FOUND	OWNER (ONE NAME)	DUE	VERIFIED

Rule: any “No” that is a live fire exposure gets stopped or contained before you leave the area. Stop is a right on this site. Restart is a decision. A named person makes it after the control is in place.

PREVENTION PLAYBOOK · TRASH, WASTE, AND OUTSIDE FIRES

Who owns it

Owner / plant manager	Waste contract and layout. Funds moving bins and storage.
Facilities	Yard, containers, compactors, vegetation.
Supervisor	Waste segregation in the area, especially hot and oily waste.
Every worker	Uses the right container. Smokes only where allowed.
Safety lead	Audits, fire marshal liaison, fire prevention plan updates.

How to verify it is working on the floor

- Walk the outside of the building. Count combustibles within 10 ft of the wall.
- Look inside the general trash for oily rags, batteries, or hot metal.
- Check the waste pickup log against how full the bins are the day before.

TOOLBOX TALK STARTER

If the dumpster caught fire at 2 a.m., how long before it was in the building, and who would see it?

Ask it at the job, not in the break room. Then listen. Write down what you hear and give it an owner before you leave.

IF YOU FIND A GAP

Move the waste or storage away from the building now. Separate the hot or oily waste. Fix the pickup schedule. Then run the gap response on page 6.

CHECK OUR WORK

Sources

1. NFPA Research, T. McGree, "Fire in Industrial or Manufacturing Properties" (Sept. 2023; 2017–2021 data)
<https://www.nfpa.org/education-and-research/research/nfpa-research/fire-statistical-reports/fires-in-us-industrial-or-manufacturing-properties>
2. NFPA Research, S. Hall, "Fire Loss in the United States During 2024" (Nov. 2025)
<https://content.nfpa.org/-/media/Project/Storefront/Catalog/Files/Research/NFPA-Research/US-Fire-Problem/osFireLoss.pdf>
3. NFPA Research, "Fires in Industrial and Manufacturing Properties: Supporting Tables" (Sept. 2023)
<https://www.nfpa.org/-/media/Project/Storefront/Catalog/Files/Research/NFPA-Research/Building-and-life-safety/osIndustrialTables.pdf>
4. NFPA, "Fire Prevention Week, Oct. 4–10, focuses on lithium-ion battery charging safety" (Sept. 23, 2026)
<https://www.nfpa.org/about-nfpa/press-room/news-releases/2026/fire-prevention-week-oct-4-10-focuses-on-lithium-ion-battery-charging-safety>
5. 29 CFR 1910.38, Emergency action plans
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.38>
6. 29 CFR 1910.39, Fire prevention plans
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.39>
7. 29 CFR 1910.157, Portable fire extinguishers
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.157>
8. 29 CFR 1910.165, Employee alarm systems
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.165>
9. 29 CFR 1910.106, Flammable liquids
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.106>
10. 29 CFR 1910.107, Spray finishing using flammable and combustible materials
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.107>
11. 29 CFR 1910.252, Welding, cutting, and brazing: general requirements
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.252>
12. 29 CFR 1910.22, Walking-working surfaces: general requirements (housekeeping)
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.22>
13. 29 CFR 1910.176, Handling materials: general (storage housekeeping)
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.176>
14. 29 CFR 1910.178, Powered industrial trucks
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.178>
15. 29 CFR 1910.303, Electrical: general
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.303>
16. 29 CFR 1910.305, Electrical: wiring methods, components, and equipment
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.305>
17. 29 CFR 1910.307, Hazardous (classified) locations
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.307>
18. 29 CFR 1910.272, Grain handling facilities
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.272>
19. eCFR, Title 29 Part 1910, current as of Oct. 8, 2026 (text checked Oct. 13, 2026)
<https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1910>
20. OSHA Directive CPL 03-00-008, Revised Combustible Dust National Emphasis Program (Jan. 30, 2023)
<https://www.osha.gov/enforcement/directives/cpl-03-00-008>

21. OSHA news release, "US Department of Labor revises OSHA's Combustible Dust National Emphasis Program" (Jan. 27, 2023)
<https://www.osha.gov/news/newsreleases/osha-trade-release/20230127>
22. OSHA, Combustible Dust safety and health topic
<https://www.osha.gov/combustible-dust>
23. U.S. Chemical Safety Board, Combustible Dust Hazard Study (Nov. 2006)
<https://www.csb.gov/combustible-dust-hazard-investigation/>
24. OSHA SHIB 06-20-2019, "Preventing Fire and/or Explosion Injury from Small and Wearable Lithium Battery Powered Devices"
<https://www.osha.gov/sites/default/files/publications/shib011819.pdf>
25. 29 CFR 1926.150–.152, Construction fire protection, fire prevention, and flammable liquids
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.150>
26. 29 CFR 1926.352, Construction: fire prevention in welding and cutting
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.352>
27. OSHA, On-Site Consultation Program
<https://www.osha.gov/consultation>
28. NFPA 660, Standard for Combustible Dusts and Particulate Solids (2025 edition; final, effective Dec. 6, 2024)
<https://www.nfpa.org/product/nfpa-660/p0660code>
29. NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work (2024 edition)
<https://www.nfpa.org/codes-and-standards/nfpa-51b-standard-development/51b>
30. NFPA 70B, Standard for Electrical Equipment Maintenance (a standard since the 2023 edition)
<https://www.nfpa.org/codes-and-standards/nfpa-70b-standard-development/70b>
31. NFPA 10, Standard for Portable Fire Extinguishers
<https://www.nfpa.org/codes-and-standards/nfpa-10-standard-development/10>
32. NFPA 30, Flammable and Combustible Liquids Code
<https://www.nfpa.org/codes-and-standards/nfpa-30-standard-development/30>
33. NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
<https://www.nfpa.org/codes-and-standards/nfpa-25-standard-development/25>
34. NFPA 72, National Fire Alarm and Signaling Code
<https://www.nfpa.org/codes-and-standards/nfpa-72-standard-development/72>
35. NFPA 86, Standard for Ovens and Furnaces
<https://www.nfpa.org/codes-and-standards/nfpa-86-standard-development/86>
36. NFPA 1, Fire Code
<https://www.nfpa.org/codes-and-standards/nfpa-1-standard-development/1>
37. NFPA 33, Standard for Spray Application Using Flammable or Combustible Materials
<https://www.nfpa.org/codes-and-standards/nfpa-33-standard-development/33>
38. NFPA 70, National Electrical Code
<https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70>
39. NFPA 70E, Standard for Electrical Safety in the Workplace
<https://www.nfpa.org/codes-and-standards/nfpa-70e-standard-development/70e>

Data retrieved and checked October 13, 2026. This guide is a practical summary for planning and self-audit. It is not legal advice and does not replace the text of OSHA standards, NFPA codes, your insurer's requirements, or the codes your authority having jurisdiction (AHJ) has adopted. State-plan states may have different or additional rules. NFPA code editions vary by jurisdiction; check which edition applies to you. Regulatory text is paraphrased. When this guide and a regulation disagree, the regulation controls.

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