

AIRE Bulletin

Preventing Building Fires



Building fires remain one of the most significant loss exposures across all industries, with the potential to cause severe property damage, prolonged business interruption, environmental harm, and serious life safety risks. While the fundamental causes of fires are well understood, evolving building designs, modern construction materials, and changing operational practices have materially altered today's fire risk landscape. Loss data consistently demonstrates that no industry is immune to fire risk; however, organizations can materially reduce their exposure to major fire losses by proactively addressing the leading contributors to fire ignition, growth, and severity through effective risk management measures.

Evolving Fire Risk Environment

Modern facilities face increasingly complex fire risk conditions driven by multiple converging factors, including:

- Expanded use of synthetic and polymer-based construction materials and contents.
- Higher fuel loads resulting from increased storage densities and energy intensity.
- More complex electrical systems, automation, and interconnected technologies.
- Greater operational interdependence and extended 24/7 occupancy patterns.

Fire behavior research consistently demonstrates that these contemporary fuel loads can lead to faster fire development, significantly higher heat release rates, and the generation of more toxic smoke. As a result, fires may quickly overwhelm legacy fire protection systems if those systems are not adequately designed, evaluated, upgraded, and maintained to address modern risk profiles.

Fire Protection Systems

Automatic Sprinkler Systems

Automatic sprinkler systems remain one of the most effective fire loss mitigation measures when properly designed, installed, monitored, and maintained.

Best practices include:

- Full building sprinkler coverage designed for current occupancy hazards.
- Continuous waterflow and valve tamper monitoring
- Central station supervision to enable rapid emergency response.
- Regular inspection, testing, and maintenance in accordance with recognized standards.

Sprinkler effectiveness is highly dependent on alignment between system design criteria and actual building use, which should be periodically reassessed as operations evolve.

Fire Detection and Alarm Systems

Fire alarm systems play a critical role in early fire detection and life safety by:

- Providing early warning during incipient fire stages
- Alerting building occupants and emergency responders
- Supporting timely evacuation and intervention

Modern systems should:

- Support both manual and automatic activation.
- Be monitored by a central station.
- Be designed, installed, and maintained in accordance with applicable national and local fire codes.

Emerging technologies such as aspirating smoke detection, video-based detection, and intelligent notification systems further enhance early detection capabilities in high risk or mission critical environments.

Portable Fire Suppression

Portable fire extinguishers remain an essential first response measure for incipient stage fires. Effective programs ensure that extinguishers are:

- Properly selected for anticipated fire hazards
- Strategically placed and unobstructed
- Routinely inspected and maintained
- Supported by employee training on appropriate use and limitations.

Electrical Fire Risk Management

Electrical system failures remain one of the leading sources of fire ignition across occupancies. Common contributing risk factors include:

- Overloaded, undersized, or aging wiring systems
- Improper equipment modifications or non-approved installations
- Loose, corroded, or degraded electrical connections
- Inadequate surge protection and grounding

To mitigate these risks, organizations should implement the following recommended practices:

- Periodic inspections conducted by qualified electrical professionals, conforming with NFPA 70B frequencies for various equipment types, ages, and conditions.
- Electrical load assessments aligned with current and anticipated operational demands.
- Infrared thermographic inspections to detect abnormal heating and developing failure conditions.
- Maintenance of proper clearance between electrical equipment and combustible materials
- Robust preventive maintenance programs for transformers and high voltage electrical equipment

Collectively, these measures align with modern predictive maintenance strategies and enable early identification of electrical deficiencies, reducing the likelihood of ignition before fire conditions develop.



Site Security Controls

Intentional fires remain a material exposure in many occupancies. Effective deterrence strategies include:

- Monitored intrusion detection systems.
- Adequate exterior lighting and controlled access
- Physical barriers such as fencing and gated entry points.
- Surveillance systems including closed circuit video monitoring.
- Vegetation management to eliminate concealment opportunities.
- Exterior security measures support both fire prevention and broader facility protection objectives.

Fire Prevention Self-Assessment Questions

- Has your facility been reviewed by local fire authorities and/or qualified risk professionals to identify emerging fire hazards and confirm alignment with current codes and standards?
- Are all recent facility changes—such as renovations, layout adjustments, or operational updates—formally recorded and assessed for their impact on fire detection, alarm, and suppression systems?
- Is fire department access to the site, including physical keys, access codes, and electronic entry systems, kept current and routinely verified for all critical areas?
- Are employees regularly informed and trained on fire prevention practices, emergency response actions, evacuation procedures, and incident reporting through both in person and digital communication channels?
- Is smoking tightly controlled through clearly identified locations that are supervised, properly marked, and equipped with fire safe disposal containers?
- Are flammable liquids, gases, and aerosols such as paints, cleaners, fuels for vehicles, and chemicals used in industrial processes stored in listed flammable liquids cabinets and/or areas that have been especially designed for their storage and use?
- Are all waste and linen containers made of non-combustible materials, fitted with self-closing lids, and positioned away from heat sources and ignition of hazards?
- Are procedures in place to routinely inspect and prevent the buildup of combustible materials around building exteriors, service areas, roofs, and critical infrastructure?
- Is there a documented cleaning and maintenance schedule for grease producing systems, such as kitchen exhaust hoods and ducts, supported by inspection records or automated reminders?
- Are fire prevention and notification practices reviewed at least annually to reflect operational changes, emerging risks, new technologies, and updated regulatory requirements?

Arch Insurance Risk Engineers (AIRE) Bulletin

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