

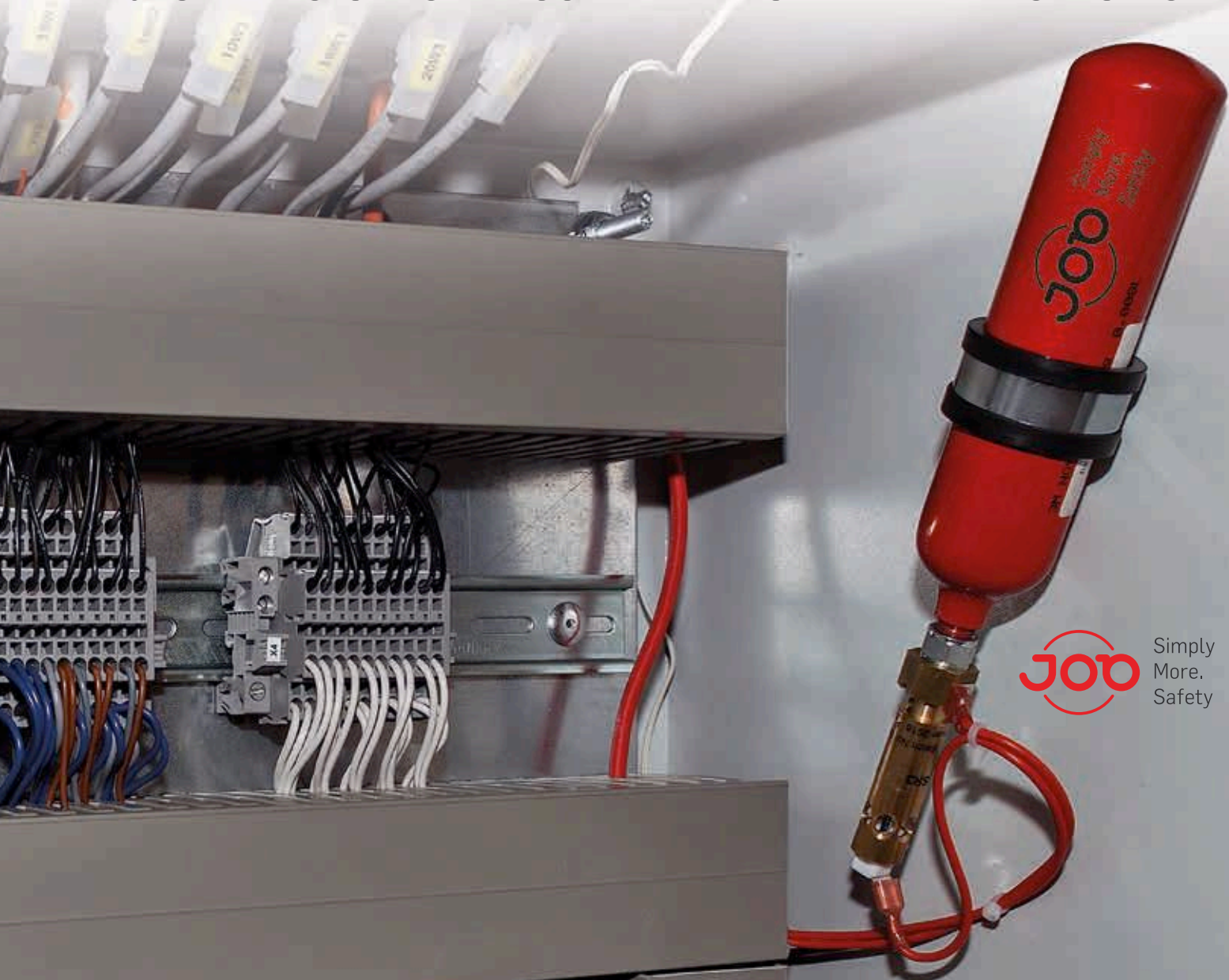
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FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE AND ACTIVE FIRE PROTECTION



Simply
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Safety

Special Report

Detecting and fighting fires
at the earliest possible point in
time helps mitigate risks and costs

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More than one third of fires globally are started by electricity. Yet, most of these fires start small. They frequently remain undetected for a significant time. Only when the fire has grown, and develops an enormous amount of heat, they may be recognized by people around, or by an external automatic detection system. The majority of electric fires start within confined spaces like electric cabinets, fuse boxes or inside home appliances and technical devices.



Rajko Eichhorn

Rajko Eichhorn is Senior Business Development and Product Manager at JOB Thermobulbs GmbH based in Ahrensburg (Germany). After his time as an aircraft electronics officer with the German Navy, Mr. Eichhorn worked with global companies, mostly in electronics and safety solutions. Mr. Eichhorn is an electrical engineering graduate and holds a MBA from Manchester Business School.

Consideration of the modern “device-integrated-fire-protection” way of thinking offers a pro-active way to deal with the inherent fire risk of such electricity powered equipment. With automatic mini fire extinguishers and extinguishing bulbs, starting fires can reliably be detected at a very early stage and effectively extinguished while still small ...long before causing outside damage or developing into tragic disasters.

Statistically, every two minutes a fire is been reported in Germany. Over one third of these fires are caused by electric devices and appliances. This means that at least every 6 minutes fire fighters are called to attend fires started by electricity – throughout the days, months and years! It is notable that the data for Germany is similar to data from most other developed countries in the world, including the USA, South Korea or France.

One of the fires that caused international attention last year undouble was the Notre Dame Cathedral Fire in Paris. On April 15, 2019 this fire destroyed one of the most iconic buildings in the world, causing damage far exceeding the plain Euro figures for the structure itself. This event can be considered a tragedy for humankind as this building represented a cultural heritage site which can never be restored into its original state. Luckily, there were only three injuries from this fire, and no one has died.

Another fire tragedy diminishing our human heritage was the spectacular loss of the renowned Natural Museum of Brazil in September the year before

the Notre Dame incident. More than 90% of all treasures preserved at the museum were lost in this fire, and cannot ever be restored.

Both tragedies have one significant aspect in common: both fires have been started by faulty electric components inside an electric cabinet.

While the severity and impact of these particular fires can mostly be defined by the loss of invaluable collectables, fires almost always constitute significant economic implications. Beside the potential for injury and even the loss of lives, undoubtedly it is the economic aspects of fires that entail highly incalculable risks every owner or operator of electric devices bears.

The economic risks of fires are especially a challenge for the smaller companies!

Typically, the costs for concomitant business interruptions by far exceeds the costs for the fires itself. Even though often covered by an industry insurer, the interruptions following such incident are the main risk for companies, for which fire is the leading cause for such interruptions (Allianz Risk Barometer 2018). In terms of statistics, in Germany the fire risk increased by 16% in 2019 compared to the previous year. For this country, it means that every five minutes there is a fire in a company.

Every third incident involving fire in the industry causes assets damage of more than 500,000 Euros, with the result that most of the companies hit will not



▲ The 2019 Notre Dame Cathedral Fire was caused by an electric fault.

recover from this event financially. Only 23 % of all companies who had have a fire can fully resume their business operations sometime after the incident. On the other hand, more than 40% of companies will have to completely shut down their business after a fire . Even though they are mostly prone to the aftermaths of fires, it is SMEs in particular who often treat fire protection superficially and only implement the absolute minimum as required by law, without being aware of the looming economic consequences of this approach.

In companies of the manufacturing industry, emerging fires are often detected quickly and, hopefully, fought by trained and skilled personnel that in such work environments normally is a) present, and b) have access to well-maintained fire extinguishers. Fires in such production equipment, electric installation or office appliances often even end up unreported due to the angst of management about retaliation from their insurers or the responsible health and safety agencies. Taking these additional fire incidents into consideration, together with the large number of fires with an “unknown source” (due to destroyed evidence), it can be assumed that the real number of electric fires is even higher than above mentioned.

Typical human behavior often leads to insufficient contemplation of fire protection

One of the reasons of why humans tend to repress thoughts about risks of fires can be found in the way people think. Human behavioral studies suggests that the brain is wired to use heuristic thinking in complex and unknown situations (compare Mitzberg, “The Structure of “Unstructured” Decision Processes“, 1976). People are using their “gut feeling” and trust their perception and senses rather than what consciences and education would suggest. A typical practical example from the fire prevention industry, supporting this concept, is what people do when they are at a shopping mall, for instance, and notice a fire alarm. As long as there is no smoke or other visible “action” (e.g. fire fighters running around) people tend to assume that this MUST BE a false alarm, because there is no fire to be seen anywhere and tragically this often happens until it is too late for some (compare Kemerovo Shopping Center Fire, 2018)

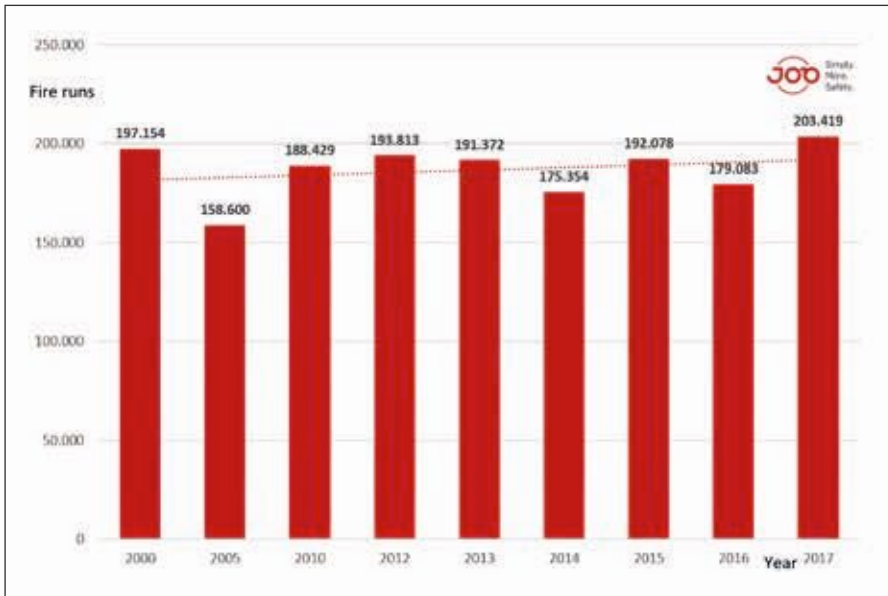
Yet, fires do happen, causing economical loss and costing lives

Many fires that draw international attention, either because of the loss of

cultural treasures or the loss of lives have started by faulty electric devices. A prominent example is the Grenfell tower fire costing 79 peoples’ lives. While regulators and lawmakers are focusing on the apparent attributes to the fire (cladding materials, non-functional sprinkler system), they are overlooking the actual cause of the fire: a defective power supply unit in a refrigerator/freezer combo.

Huge efforts are being made now to avoid such fire related damage to people, structures and values. But all these ever increasing standards and norms do not drive down the number of fires.

By looking at the origins of fires, it becomes clear that fire protection should be approached more selectively to be more effective. As was pointed out above, over 1/3 of all fires are started by electricity. Now it can be assumed that making electric and electronic devices inherently fire safe could be a good way to go.



◀ Total number of fire related operations for German Fire Fighters from 2000-2017 (source, statista.org).

This explains why the inherent risks from electric and electronic products and installations are often not recognized and subsequently are not taken into consideration to their full extend.

Device-integrated fire protection for saving lives and values

A cost effective approach to reducing these incalculable risks are stand-alone, thermally triggered automatic miniature fire extinguishing units (AMFE) and extinguishing fuses (E-Bulbs) developed and manufactured by company JOB Thermobulbs in Ahrensburg near Hamburg (Germany). These economic AMFE can be retrofitted easily into existing electric equipment and systems, providing instant reliable device-integrated fire protection. The fire detection is carried out using the same activation principle as a sprinkler – with its own VDS-approved thermos-glass ampoules. Due to the increasing heat in a device, in case of a fire, the temperature-configurable thermo-ampoule bursts and opens the connected extinguishing cartridge without the need of an electric signal and releases the approved

Triggers of electrical fires

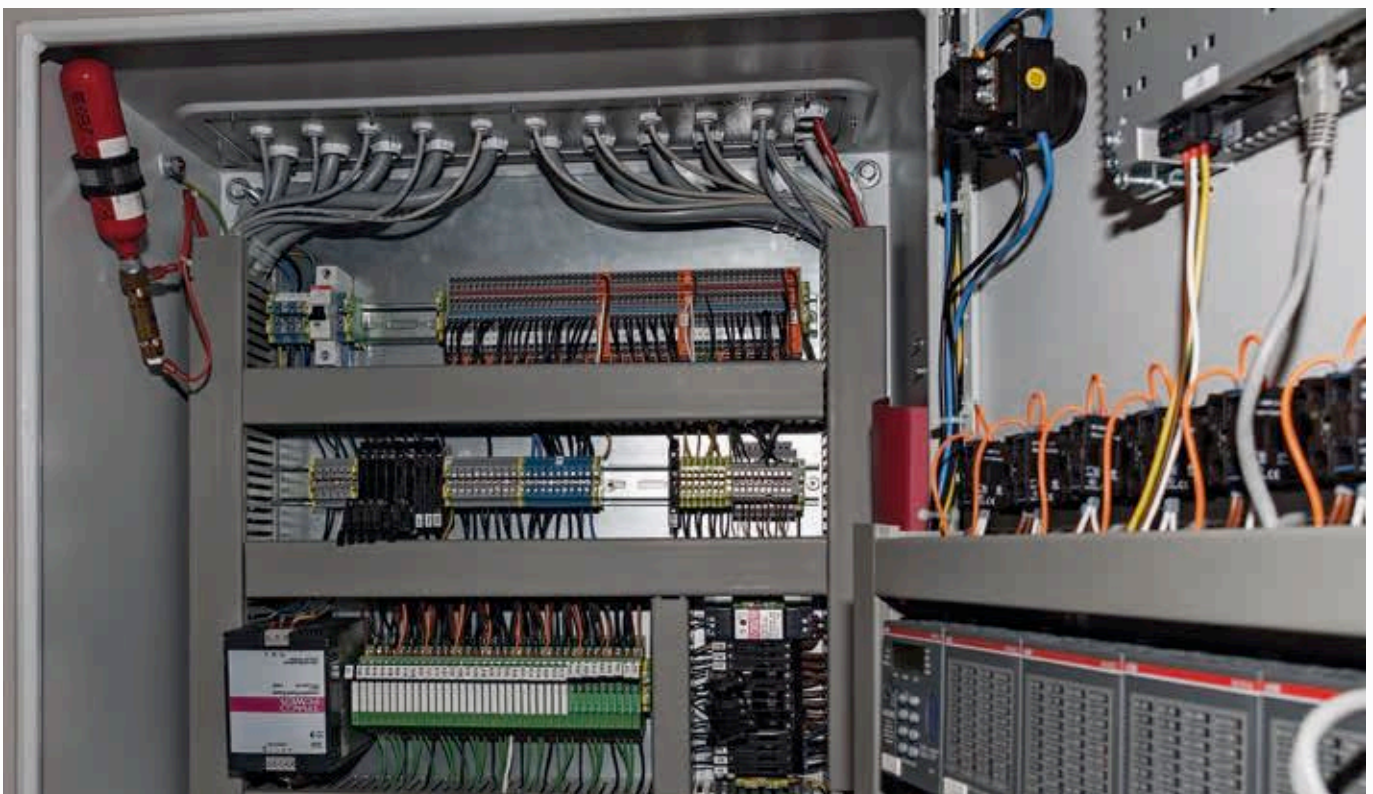
There are a wide variety of triggers for such electrical fires:

- weak soldering spots
- manufacturing errors
- inadequate plug connections
- impermissible operating conditions
- component failure.

All of these causes, combined with the ever-increasing electrification, can be felt by people in the form of fires, damages, business interruptions and product recalls.

Existing protective measures such as residual current switches, contactors or fuses often fail to recognize a fault-condition or only detect it very late while defensive actions like using a fire extinguisher requires people to be present when the fire starts. Many of the above listed causes of error are even not directly influenceable or avoidable by a manufacturer or operator.

▼ The AMFE reliably activates thermally at a wide range of temperatures, or can be activated from external sensors like a smoke detector.



SMALLEST FIRE EXTINGUISHER IN THE WORLD

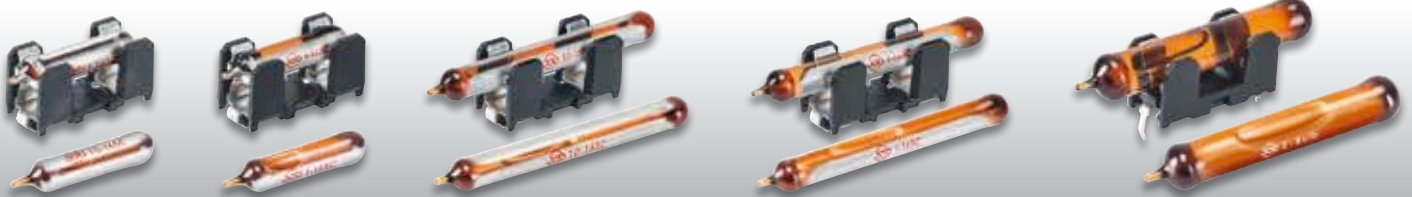


E-Bulb:

- Extinguishes the fire with 3M NOVEC engineered fluid!
- Directly inside of a device, on a PCB!
- Interrupts the electricity irreversibly (no re-ignition)

Positive contribution for TCO

- Safer products – Securing lives, property and lowering risk of business interruption
- Fire protection as unique selling proposition (USP) against global competition
- Possibility to reduce flame retardant materials



Device integrated fire protection

with AMFE and E-Bulb helps mitigating inherent fire risks of electronic devices and electric cabinets



AMFE:

- Reliably detects fires, extinguishes and monitors
- Fighting starting fires at the point of origin – INSIDE electric cabinets
- Uses certified engineered 3M NOVEC agent



Benefits to the user and manufacturer:

- Easy to retrofit into existing installations
- Certified and approved solution for small electric cabinets or machines
- No collateral damage in case of activation: clean, non-toxic, non-corrosive, nonconductive
- Most economical fire protection solution for small enclosures of up to 1.55m³ / 55ft³



Appliances



Valuable collections



Electrical cabinets or devices



Rail



Automotive



◀ E-Bulb protected LED advertising screen at Frankfurt International Airport for enhanced fire-safety in public spaces.

ever increasing regulations, norms and standards in most countries the number of fires doesn't decline significantly, and are even increasing. It can be assumed that this is a direct result of the ever increasing electrification we are experiencing. By looking at the origins of the fires it becomes clear that electric and electronic devices are the major contributor to fires around the world.

And it is not just the irreplaceable heritage treasures which are getting lost – it is the continuation of losing people's lives and the loss of assets which demands a different way of thinking fire protection.

Device Integrated fire detection, at the earliest possible point in time, and at the point of origin, can economically help reducing the risks of severe electric fires by avoiding small electric faults developing into big disaster. Automatic miniature fire extinguishers and extinguishing bulbs can be flexibly placed inside such devices. They are reliably detecting fires, suppressing the fires locally, and thus protecting the surroundings.

If over one third of all global fires can be further reduced by applying this new way of thinking and implementing economical solutions like AMFE and E-Bulb, our modern world becomes not only a more comfortable one... but a safer one, too!

➔ For more information, go to www.job-group.com

References

- 1 Richman-Abdou, Kelly (10 September 2019). "Notre-Dame Updates: What We Know About the Cathedral Five Months After the Fire". My Modern Met. Estadão, ed. (23 March 2019). "Curto em ar-condicionado causou fogo que destruiu Museu Nacional, diz perícia" [Short on air-conditioning caused fire that destroyed National Museum, says expertise]. Retrieved 23 March 2019.
- 2 see „Logistics Heute" magazine and GdV statistics (www.gdv.de)
- 3 <https://www.insurancebusinessmag.com/uk/news/commercial-property/revealed-cause-of-grenfell-tower-fire-71351.aspx>

extinguishing agent "NOVEC" (3M) into the device. This highly efficient, gaseous extinguishing agent is non-toxic, non-conductive and residue-free after application – the starting fire is effectively extinguished immediately, directly at the point of origin of the fire. A variant with signal terminals (S-AMFE) can be used to self-surveillance and signaling the extinguishing activation, which can then be used to interrupt the power supply into a device, and to alert operating personnel. Another variant can be used in conjunction with smoke detectors for example, to activate the extinguishing process before the thermal triggering point (the variable, designated activation temperature) is reached (R-AMFE). However, it will always work redundantly through thermal activation.

The smallest fire extinguisher in the world

In addition to the larger AMFE, JOB has also developed the "Smallest Fire Extinguisher in the World". Measuring only 5x20mm (the standard measurements of a traditional electric fuse), the E-Bulb works like a thermal sprinkler bulb, but again contains the engineered 3M NOVEC extinguishing agent. Furthermore, the glass surface of the E-Bulb is electrically conductive which makes it suitable for typical supply

currents of electric and electronic devices. In case of a fire, when the activation temperature is reached, the glass bulb bursts and releases its content of extinguishing agent inside the electronic device, quickly putting out a starting fire. NOVEC has a very low boiling point and becomes a gas at the moment of release. This process effectively extinguishes even a high-energy fire by cooling, without leaving residues of the extinguishing agent or causing short circuits.

At the same time, the electrically conductive surface of the glass ampoule is destroyed what interrupts the electric current into the device. This prevents re-ignition from the supplied energy.

The effectiveness and reliability of the patented AMFE and E-Bulb has not only been independently verified and confirmed by UL, TÜV and the German VDE but also carries a VdS certification. E-Bulb and AMFE are trusted by manufacturers and users around the world to mitigating inherent fire risk of electric and electronic devices and installations.

Conclusion

Fires happen, and the fire prevention industry is doing tremendous efforts to mitigate fire risks for the society. It must be said, however, that even with all the