When Global EV Fire Guidance Is Built on Tests That Maximize Failure

Two research programs are shaping international guidance on vehicle fire blankets.
Neither evaluated the procedure used on the fireground.

Frank Brubakken | Founder, CEO and Product Designer, Bridgehill AS | 1,500-word edition

Abstract

Two research programmes reporting deflagrations beneath deployed vehicle fire blankets, the 2025 UL/FPRF testing and the 2026 Fire Safety Research Institute and UL Research Institutes testing, are already influencing operational guidance, training material and discussion among fire authorities in several countries. This article examines a narrower question than whether those observations are correct: did the experiments that produced them represent the deployment procedure used operationally in more than fifty countries for approximately fifteen years? The evidence indicates they did not. Water was applied before deployment in both programmes, and in 2026 the blanket was repeatedly lifted afterward, including when ignition was judged probable. Those departures change the environment beneath the blanket, and they define the scope of what the research can tell us.

Introduction

This article examines the 2025 UL/FPRF vehicle fire blanket programme and the 2026 Fire Safety Research Institute / UL Research Institutes programme, both of which reported deflagrations beneath deployed vehicle fire blankets and are already influencing international operational guidance.

The operational procedure evaluated here has been used internationally for approximately fifteen years without a reported operational deflagration. It is straightforward: no water before deployment, no water beneath the blanket, the cover left undisturbed while the battery event runs its course, external temperature monitored from outside, and removal only after cooling to approximately ambient temperature.

This is not a criticism of the researchers. Both programmes produced valuable observations and identified genuine hazards associated with combustible gases accumulating beneath a blanket. The title refers to the test conditions, not to researcher intent. But both programmes departed from the operational procedure before the blanket was fully in service, and the 2026 programme departed from it again afterward.

The central question is therefore not whether a deflagration can occur beneath a fire blanket. It can. The question is whether the experiments producing those deflagrations represented established operational deployment.

They did not. Yet guidance is increasingly being shaped as though they did.

WHAT WAS TESTED

- Water applied before deployment in both programmes
- The blanket lifted repeatedly after deployment in the 2026 programme
- Oxygen deliberately introduced beneath the cover, including when ignition was judged probable
- No experiment left the blanket undisturbed until the simulated incident was complete

Two procedures

The distinction becomes clear when the operational procedure is compared directly with the experimental protocol.

Established operational deployment	Experimental protocol
No water before deployment	Water applied before deployment
No water beneath the blanket	Continuous water beneath the blanket in BS experiments
Blanket left undisturbed	Blanket lifted repeatedly
External temperature monitoring	Repeated inspection beneath the blanket
Removal only after cooling to approximately ambient	Manipulation while thermal runaway could still be active
Approximately fifteen years with no reported deflagration	Lifting deliberately performed to investigate ignition hazards, including where ignition was judged probable

Established operational deployment

1. Pull the blanket over the burning vehicle.
2. Apply no water before deployment or beneath the blanket.
3. Leave the blanket undisturbed.
4. Monitor the blanket temperature externally.
5. Remove only after cooling to approximately ambient temperature.

Experimental protocol

6. Water applied before blanket deployment.
7. In the blanket plus suppression experiments, water applied beneath the blanket afterward.
8. The blanket lifted repeatedly to introduce ambient air.
9. Lifting performed in some experiments when ignition was judged probable.
10. No experiment left the blanket undisturbed until the simulated incident was complete.

These are not simply different operating styles. They are different physical systems. One seeks to contain the event while minimising oxygen introduction and additional gas production. The other deliberately investigates what happens when oxygen is introduced where combustible gases may already have accumulated.

What the experiments actually tested

The 2025 programme. The experiment later described as dry did not begin with a dry vehicle. Approximately twenty to thirty seconds of water suppression preceded deployment. At the documented handline flow rate of roughly 568 litres per minute, some 190 to 284 litres reached the vehicle before the cover was placed. No further water followed. It represented a wet vehicle beneath a blanket.

The 2026 program. For the blanket plus suppression experiments, the report states the cabin fire was briefly suppressed with a handline for fewer than ten seconds before deployment, approximately ninety five litres at the reported flow rate. For the two blanket only experiments, Table 4.3 records the suppression water volume as none. It has since been independently confirmed that water was also applied before deployment in those experiments. The report does not document its duration. The quantities differed between programmes, but neither evaluated a procedure requiring a dry vehicle before deployment.

Deliberate manipulation. The second departure came after installation. The report explains that repeated lifting formed part of the research design, specifically to investigate hazards associated with manipulating the blanket and introducing oxygen beneath it. It acknowledges that this diverged from recommendations issued by some manufacturers and states that in some experiments the blanket was lifted when ignition of accumulated gases was considered probable, in order to study smoke ignition severity.

Operational deployment seeks to keep oxygen out. The protocol deliberately introduced it.

The report itself records that once the blanket was deployed and initial flaming had subsided, little changed until it was lifted. In experiment E FM B, the second lift was followed by a significant deflagration and sustained flaming. The report attributes this to oxygen mixing with accumulated gases and bringing the atmosphere into the flammable range.

Two further deflagrations occurred during E TM BS several minutes after the last manipulation and were described as unprovoked. Both occurred in a water suppression experiment in which more than four thousand litres had already been applied, and after the blanket had previously been manipulated. They therefore do not represent established dry deployment either.

Importantly, no experiment left the blanket completely undisturbed until the simulated incident was complete.

The report's own guidance. After discussing its findings, the report recommends that once a blanket has been deployed, firefighters should maintain a safe distance and not manipulate it in any way, since manipulation may introduce oxygen and lead to reignition or deflagration. This includes lifting and repositioning.

The report therefore advises firefighters not to perform the manipulation that formed a central part of its own research protocol. That does not weaken the research. It clarifies what the researchers deliberately investigated and what operational crews are being advised to avoid.

Following the 2025 programme, Bridgehill informed NFPA and other involved organisations that correct deployment requires no water before or beneath the blanket and submitted technical documentation explaining the fire physics. That information was available before the 2026 experiments.

Why the difference matters

Gas accumulation under a blanket is real and must not be understated. Thermal runaway produces combustible gases including hydrogen, carbon monoxide and light hydrocarbons. These gases can accumulate beneath any cover.

But combustible gas alone does not create a deflagration. Oxygen must also be present at an appropriate concentration.

Correct deployment therefore seeks to leave the cover undisturbed. In the experiments, oxygen was deliberately supplied through repeated lifting. Water further changed the environment by producing steam and potentially increasing hydrogen production when it reached hot and damaged battery materials.

This distinction matters operationally because rejecting blanket containment does not leave the fire service with no alternative. It preserves a response based largely on water, with its own consequences.

Occupational exposure as a firefighter is classified by the International Agency for Research on Cancer as carcinogenic to humans. Every additional minute close to a burning vehicle increases exposure to smoke, combustion products, hazardous vapours and contaminated equipment. A blanket can be deployed within seconds, allowing crews to withdraw and monitor externally.

Large volumes of suppression water also redistribute contamination. Runoff from electric vehicle fires contains metals, fluorine compounds and other hazardous substances requiring management. Greater volumes mean more contaminated liquid to control.

Cooling may also reduce visible activity while significant energy remains stored in the battery, creating stranded energy during recovery, transport and storage and a risk of delayed reignition. Dry containment instead allows the event to continue beneath the cover. It does not guarantee complete discharge of every cell, and vehicles must still be handled carefully.

These are relevant operational outcomes whenever two tactics are compared.

The operational record

Laboratory testing is not the only evidence available. Across approximately fifteen years of reported operational deployment in more than fifty countries, no deflagration has been reported when the blanket has been deployed dry, left undisturbed and removed only after cooling to approximately ambient temperature.

That field experience has not been collected systematically, and it should be. But it provides a strong reason to test the established procedure itself before drawing conclusions about that procedure from experiments using different conditions.

Conclusions

The published research demonstrates that combustible gases beneath a vehicle fire blanket deserve serious operational attention, and that introducing oxygen beneath a deployed cover can produce deflagration. These are valuable findings.

But the programmes did not evaluate the deployment procedure used internationally for approximately fifteen years. Water was applied before deployment in both programmes, and the 2026 programme repeatedly manipulated the blanket afterward. The report acknowledges that this manipulation diverged from some manufacturer recommendations, and its own operational guidance advises firefighters to avoid it.

These distinctions do not invalidate the research. They define its scope.

Whether the findings apply equally to established dry deployment remains an open question because that procedure has not yet been evaluated under comparable conditions.

Three recommendations

Test the established procedure. A complete series should evaluate the operational method as intended: no water before deployment, no water beneath the blanket, no manipulation afterward, external temperature monitoring only, and removal after cooling to approximately ambient.

Measure the atmosphere without disturbing the blanket. Gas species, including hydrogen, can be sampled at the natural venting points created by folds and lower edges. This would characterise the atmosphere while leaving the deployment undisturbed and without introducing the condition being investigated.

Distinguish between procedures rather than products. Where guidance recommends against a practice, the practice should be named. Different deployment procedures create different fire environments, and guidance should reflect that rather than treating all blanket operations as one tactic.

Fifteen years of operational deployment without a reported deflagration deserves experimental evaluation. Only when laboratory testing and operational evidence examine the same procedure can guidance identify the safest practice with confidence.

Until then one distinction remains fundamental: the published experiments did not test the established dry deployment procedure. They tested a different one.

References

Dunbar, R. (2026, April). *HF & the issues, including burns conference and PPE suitability* (Version 3).

Fire Safety Research Institute, & UL Research Institutes. (2026). *Full scale electric vehicle fire experiments and recommendations for fire incident response*. https://doi.org/10.60752/102376.29066621

He, M., Hector, L. G., Jr., Dai, F., Xu, F., Kolluri, S., Hardin, N., & Cai, M. (2024). Industry needs for practical lithium-metal battery designs in electric vehicles. *Nature Energy, 9*, 1199–1205. https://doi.org/10.1038/s41560-024-01624-5

International Agency for Research on Cancer. (2023). *Occupational exposure as a firefighter* (IARC Monographs on the Identification of Carcinogenic Hazards to Humans, Vol. 132).

Li, D., & Zhang, Q. (2024). Hydrogen releasing law and in situ computed tomography investigation of structural damage of waded lithium ion batteries. *Journal of Energy Storage, 85*, 110907. https://doi.org/10.1016/j.est.2024.110907

Liu, X., Yin, L., Ren, D., Wang, L., Ren, Y., Xu, W., Lapidus, S., Wang, H., He, X., Chen, Z., Xu, G. L., Ouyang, M., & Amine, K. (2021). In situ observation of thermal driven degradation and safety concerns of lithiated graphite anode. *Nature Communications, 12*, 4235. https://doi.org/10.1038/s41467-021-24404-1

Quant, M., Willstrand, O., Mallin, T., Hynynen, J., et al. (2023). Ecotoxicity evaluation of fire extinguishing water from large-scale battery and battery electric vehicle fire tests. *Environmental Science & Technology, 57*(12), 4821–4830. https://doi.org/10.1021/acs.est.2c08581

Frank Brubakken is Founder, CEO and Product Designer of Bridgehill AS. Disclosure: Bridgehill has developed and manufactured fire blankets for vehicles, lithium battery fires and wildfire protection for approximately fifteen years.