CFIS 2023

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Title:

Effective and efficient AFV firefighting

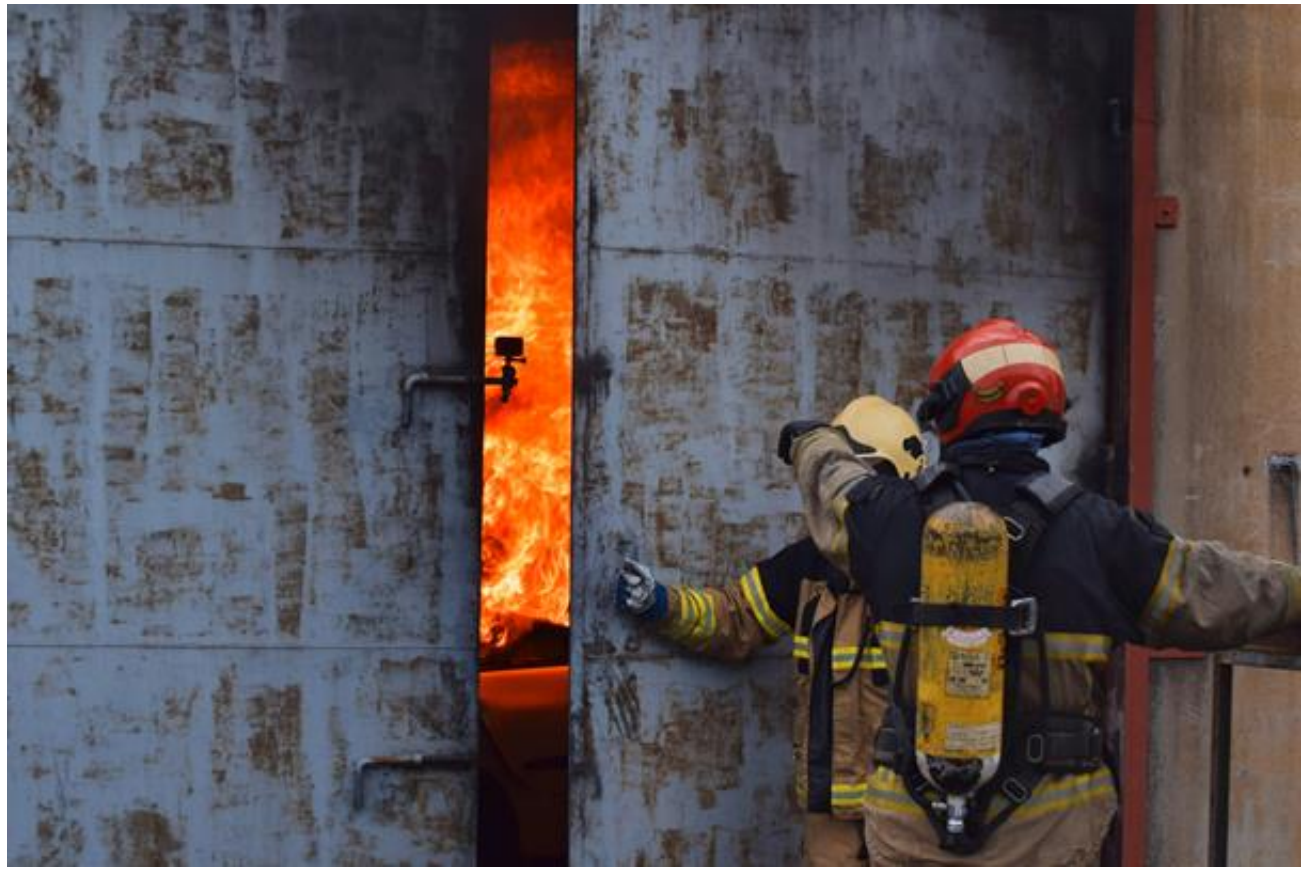
Reasons for manual firefighting

For life saving

Proactive measure at increased risk but no fire

If needed in addition to fixed system or if fixed system does not work

At stable post-fire conditions like cooling down, inspection or monitoring



Water application on EV fires

Water is a good coolant for general vehicle fires, also for Li-Ion batteries

Extinguishment of a car fire possible, battery is only minor part of fire energy, and will be suppressed

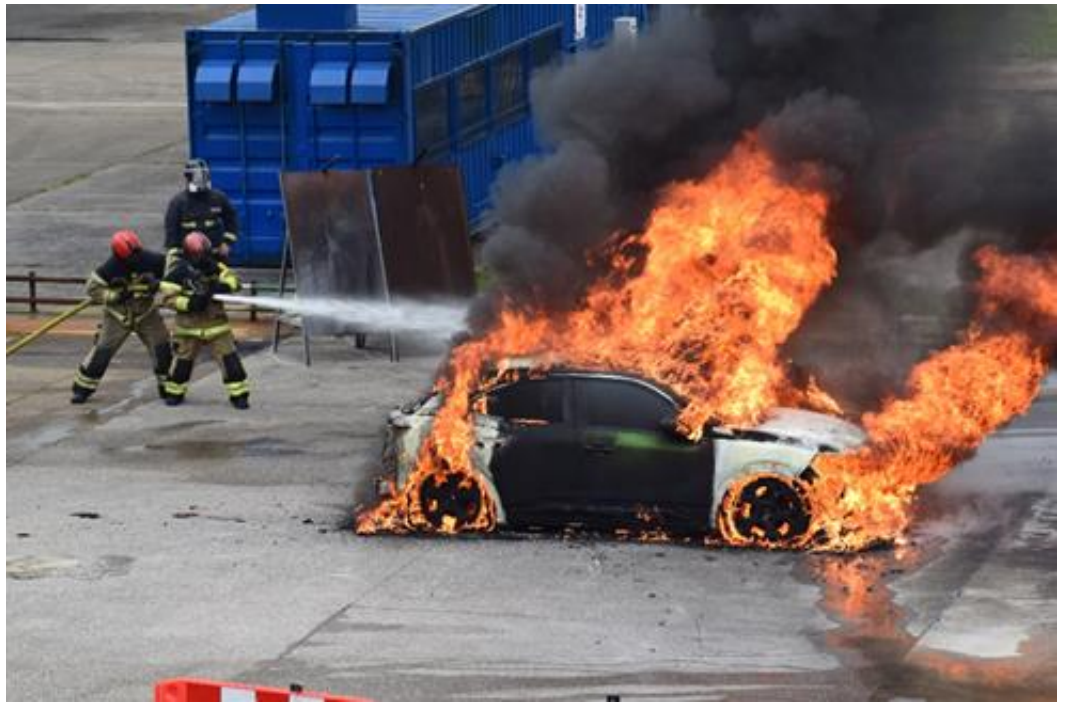
No final extinguishment of battery thermal runaway possible but this may be acceptable situation

Most fires are not related to traction battery

Water washes out gases from air space, reducing toxicity and risk of explosion

No risk of electrocution, since firefighter will stay well away from battery

LASH FIRE experience shows that water is effective

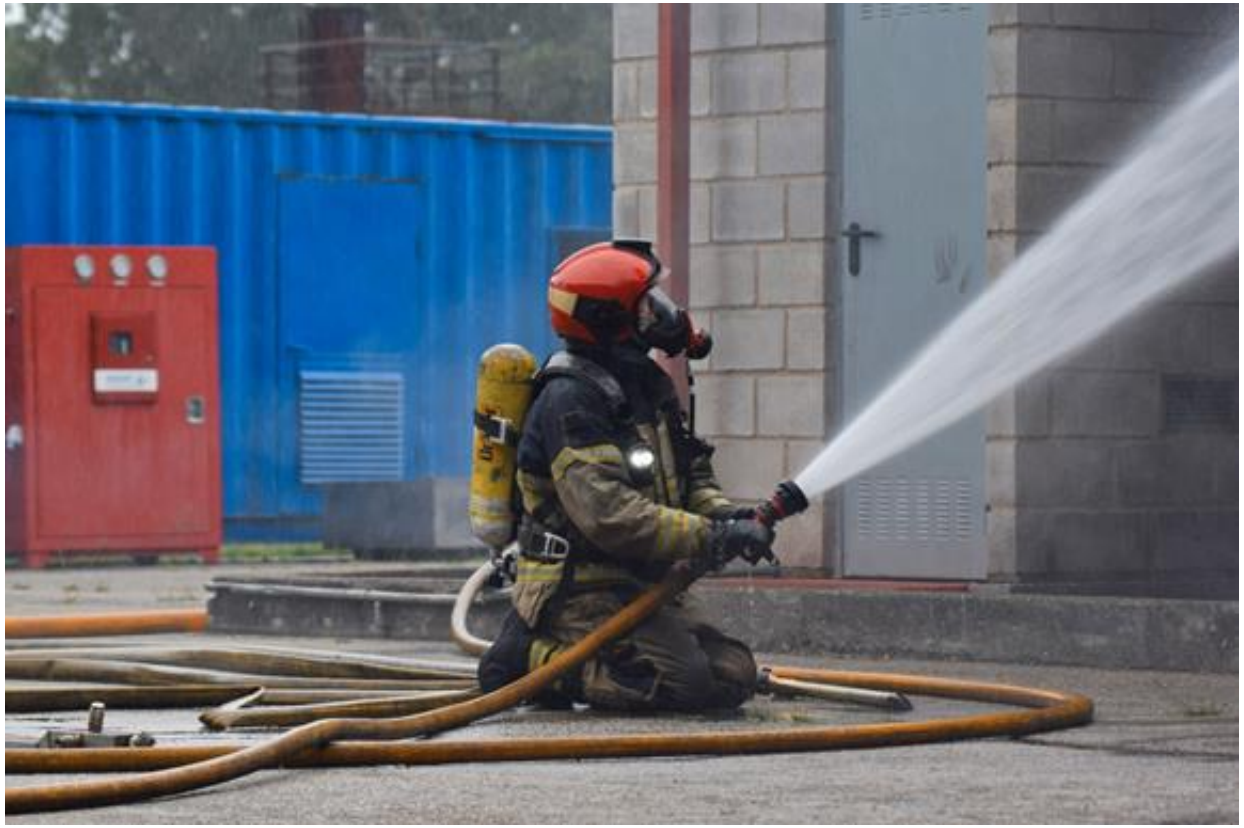


Fire suits

Fire suits should be compliant with EN 469:2020 X2 Y2 Z2

With flash hood, second layer and BA, these will protect well from all vehicle fire gases including those of Li-Ion batteries such as HF

Maximum total exposure time in a toxic smoke environment is 40 min



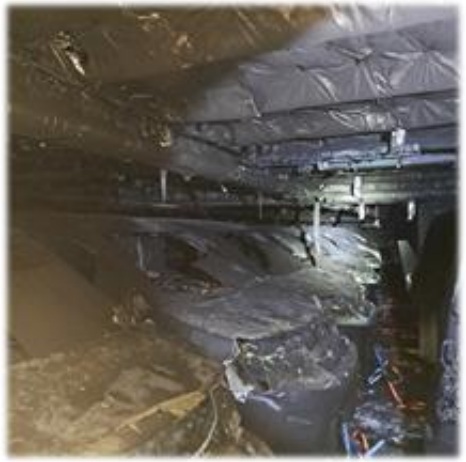
Fire hoses and nozzles

General firefighting practice used onboard

Approach 45º from the center line of vehicle keeping a safe distance

Tight parked vehicles may hinder approach

45 mm hose is standard, but 25 mm hoses are easier to operate



Boundary cooling device

A water boundary cooling device can be used as a proactive measure if suspicion or indication of thermal runaway, as a complement to drencher or as a post fire measure

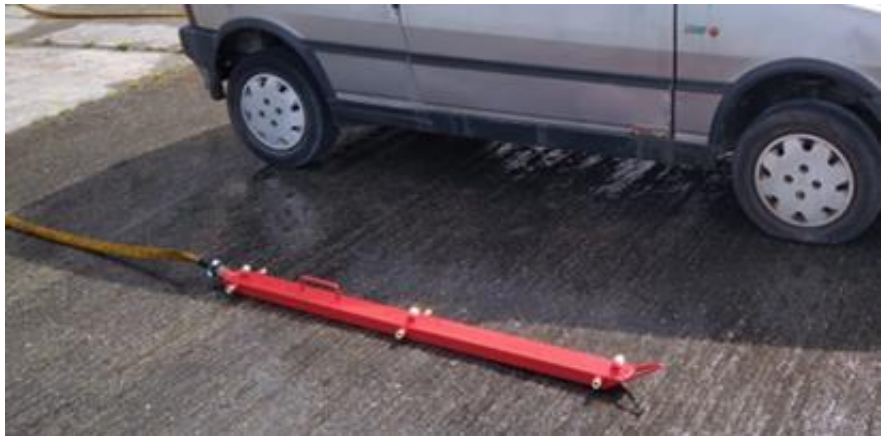
Two cooling devices for one car, one each side

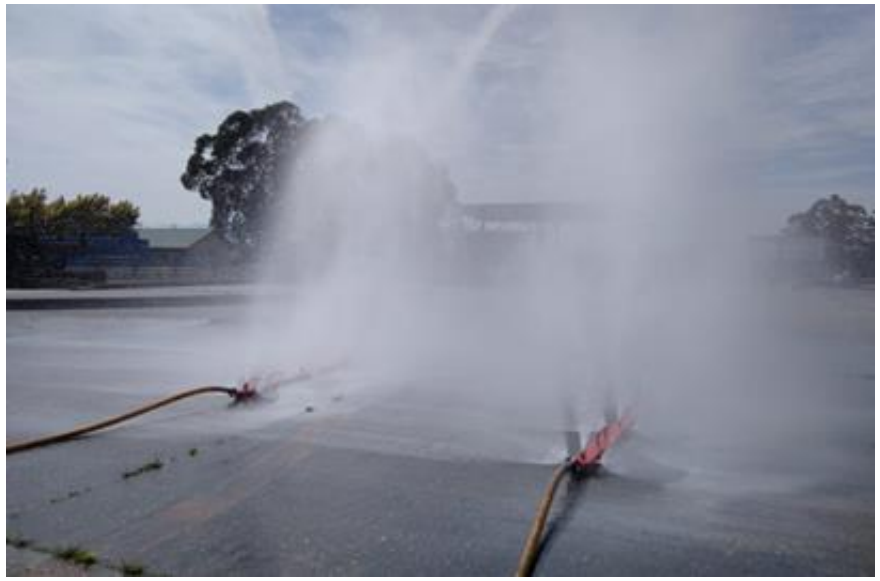
The device should be prepared in a remote/protected location

Can be carried, pushed with a rod or pulled with a rope to position, depending on situation

Creates a water mist/shield between and underneath the vehicles

Working pressure between 8-10 bar, water flow 450 lpm, length 1.7 m, weight 7 kg





Fire blanket

Purpose to contain and suppress a general car fire, and avoid reignition

Dimensions about 6x8 m, weight 20-25 kg, two firefighters are needed for handling

Can contain jet-flames and partially toxic gases but will NOT stop a thermal runaway.

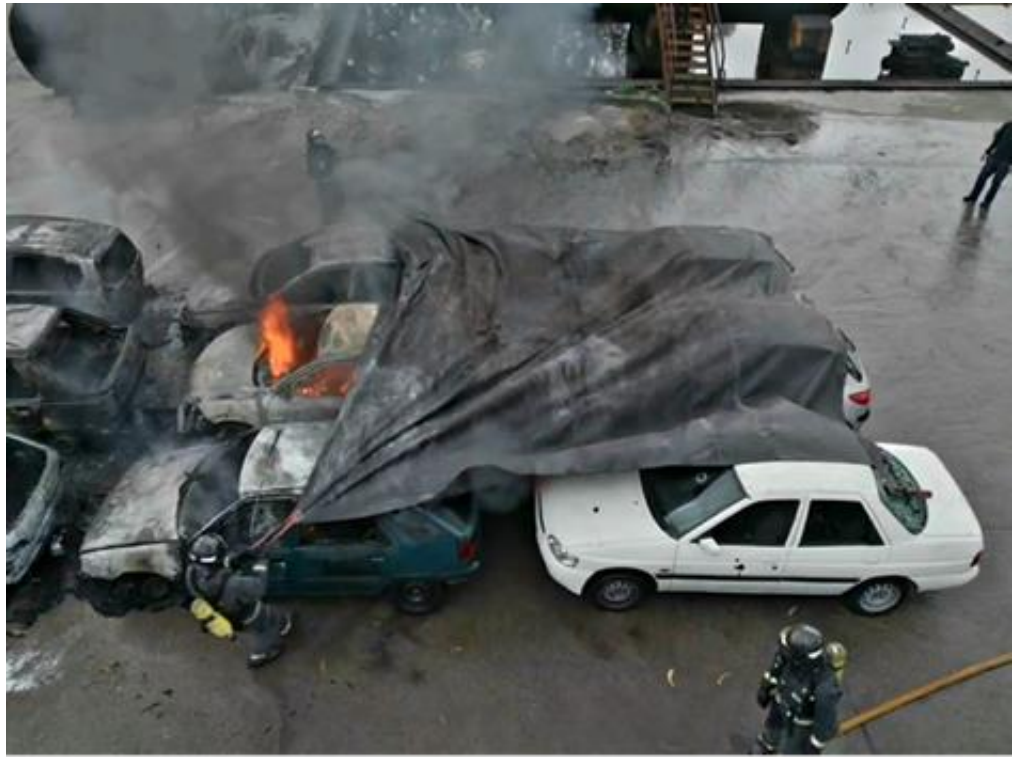
One car as barrier between fire and crew member

Hose team may be needed for protection

Not possible to use for a fully developed fire

Shape of vehicles and parking patterns may be a challenge

Risk of ignition of flammable gases accumulated under blanket



Water mist lance

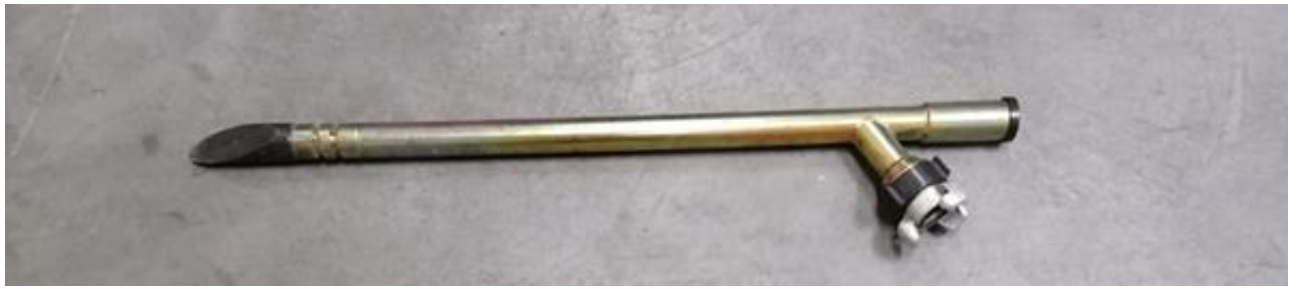
Primary intended to penetrate an enclosed space without allowing oxygen ingress. Not especially designed for AFV fires

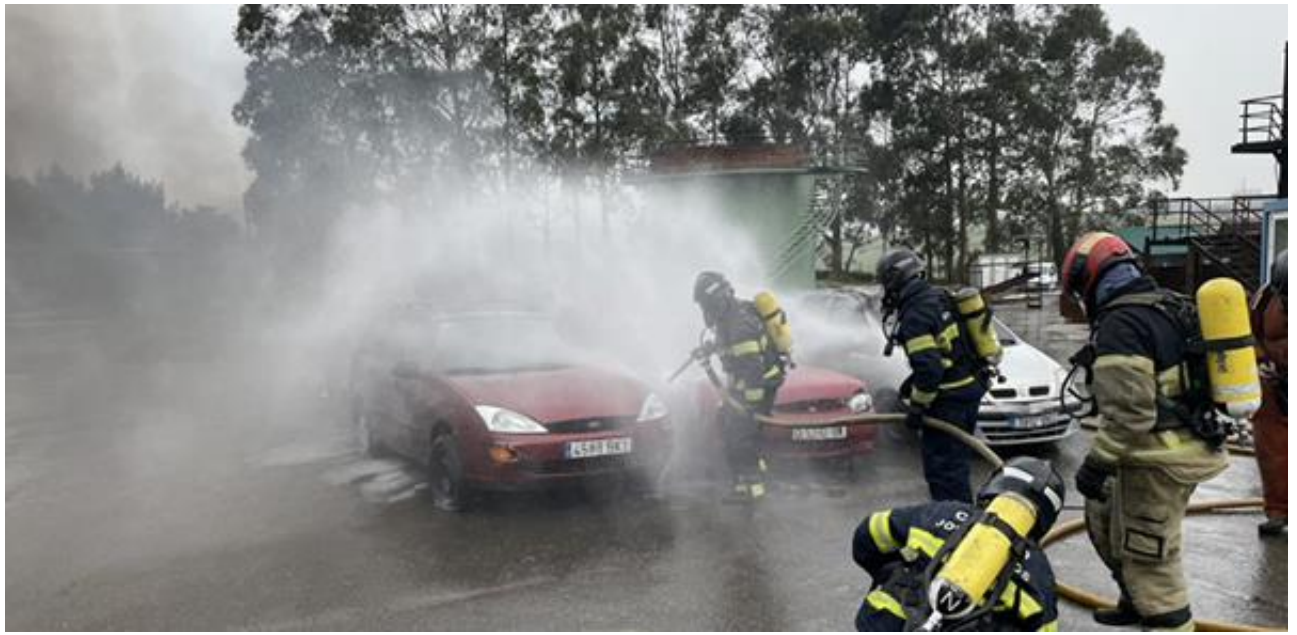
Can be an alternative to boundary cooling device to create a water screen

Approach vehicle and penetrate/pierce in the enclosed space on fire

Once the device is in place, the firefighters can retreat to a safe position

For EVs, do not use in engine compartment or directly in the battery due to risk of high voltage components





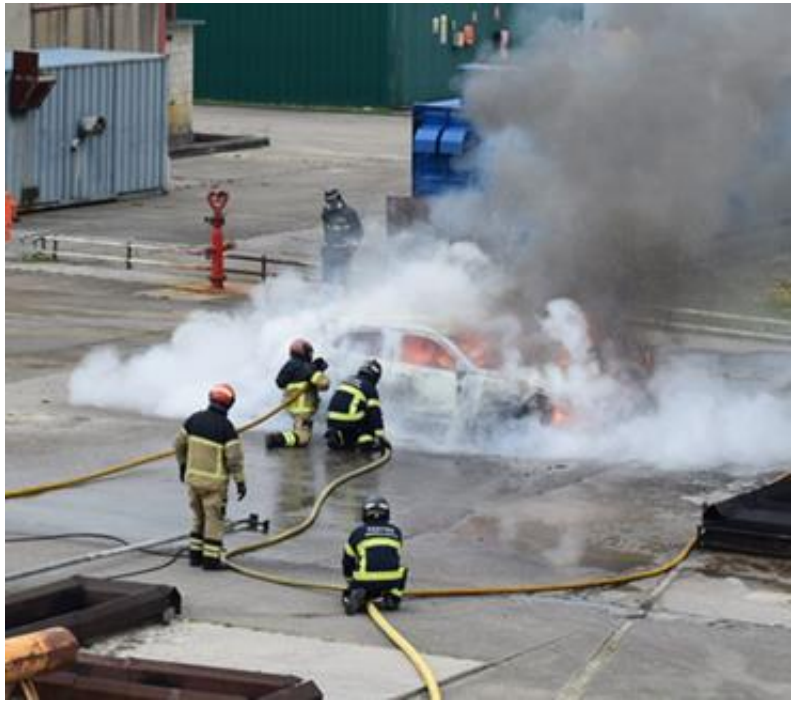
Monitoring & Cooling

Due to risk of reignition the car must be monitoring after fire is suppressed

There is no need to remove a blanket, water mist lance or cooling device once they are in position.

Cooling down should continue until safe return to port

When in port vehicle should be moved to safe location ashore



Gear handling & Fire team wellbeing

All equipment that has been used in the fire and smoke should be treated as hazardous

Once it is time to undress, firefighters must be assisted by crew members to undress and put the used PPE into sealed containers

Supporting crew members should also be protected, preferably by single use disposable protective suits and face mask

Undressing should be trained regularly

Final Considerations

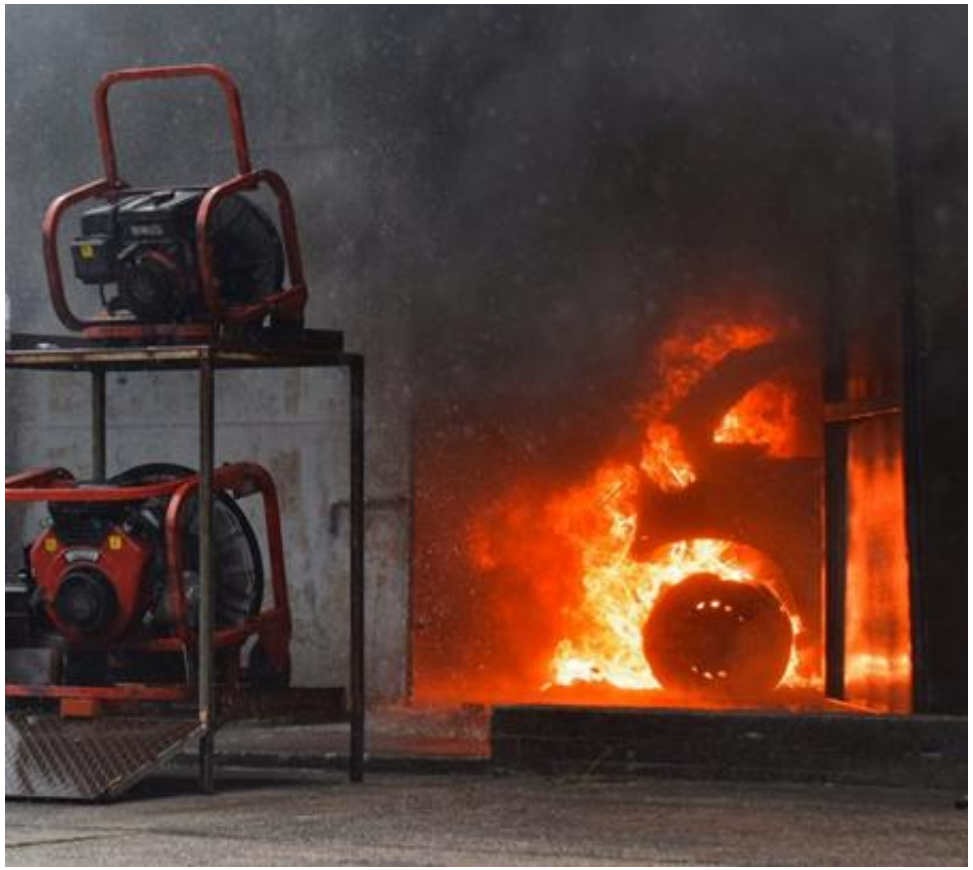
Always consider first response with handheld device, since most car fires does not originate in the traction battery or fuel tank

Start drencher without delay once fire is developed to contain and suppress the fire. If possible, keep it working during manual intervention

Emission of toxic gases, sudden jetflames and reignition must be considered at all times

A Li-Ion battery thermal runaway cannot be stopped, but slowed down and suppressed

Tactical ventilation (activation of mechanical ventilation) may be used to improve visibility



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CONFERENCE ON FIRE SAFETY AT SEA

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