LASH FIRE

Legislative Safety Assessment for Safety Hazards of Fire
and Innovations in Ro-Ro Ship Environment

Fires in Alternatively Powered Vehicles onboard Ships
Questions & Answers

Lash Fire Webinar
14th October 2020

Q&A – Speakers

In order to go directly to each speaker's Q&A, please click on the respective image.

Franz Evegren, RISE

Martin Carlsson, STENA

Robert Rylander, RISE

Dana Meissner, ISV

Sifis Papageorgiou, EMSA

The LASH FIRE project and why electrical vehicle fires are of concern

Question	Answer
I was under the impression that the SOC of a battery does have an impact on the thermal runaway of a lithium-battery.	Yes, perhaps the statement was kind of tricky. The SOC does indeed have an impact on the thermal runaway of a lithium-ION battery, but primarily it affects the growth and peak heat released, not the total heat released. As you can see in the graph, with 100% SOC the heat release rate increases rapidly, but the fire scenario is also over quicker than for lower SOC.
I thought that was the reason why IATA requires lithium-ion-batteries to have a max. SOC of 30% when being transported by air.	Correct, the SOC also affects the probability of thermal runaway of a lithium-ion battery. With SOC<30%, thermal runaway is very unlikely/impossible, and SOC<50% makes TR quite unlikely. Please note that the graph shows batteries burning while exposed to an external burner.

Study of safety aspects of carriage and charging of electric vehicles on ro-pax vessels

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Question	Answer
My question concerns the integration of the batteries on board and the choice of the location and the means of extinction. Are there any tests or studies to quantify the risks due to an explosion or fire from the batteries?	If this Q refers to onboard battery installations for propulsion or auxiliary purposes, there are few initiatives ongoing or planned, such as Lionfire II by RISE, investigating gas spread and extinguishing methods.
Hi Martin, how do you secure a proper training of the crew?	STCW is probably the best formal instrument to secure this. Basic hazard awareness training may be held already now, but recommendation is to wait with in depth sessions until we are a bit more stable on what risks are most significant and best measures to counteract. Training centers are on the same learning curve as industry som message may vary if our policy is not in place.

Question	Answer
Is a fixed extinguishing system (Drencher) sufficient to extinguish the fire on this type of vehicle? Or should the intervention of a firefighter be planned?	The fire energy/HRR of a APV is similar to a classic fossil fuel car, on the other hand there is no practical method to fully extinguish a thermal runaway battery. The thesis is therefore that existing SOLAS compliant drencher system will contain a EV fire similar for fossil. This is to be proven in LASHFIRE. In parallel semi manual methods such as placing water cooling devices at a EV suffering from TR are investigated. Fully manual action is not recommended due to toxic gas exposure. Reference to the BREND reports investigating this matter: http://www.diva-portal.org/smash/get/diva2:1392427/FULLTEXT01.pdf http://www.diva-portal.org/smash/get/diva2:1392421/FULLTEXT02.pdf

Study of safety aspects of carriage and charging of electric vehicles on ro-pax vessels

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Question	Answer
Are you aware of any developments of electric vehicle equipped with auto-extinguishing systems?	Some heavy ICEV have extinguishing systems in engine compartment, some EV manufacturers may be investigating the matter, but in general they do NOT this since it would imply that their vehicles pose a fire hazard. Passive systems involving fire retardant electrolyte or coolant have been mentioned. One solution in discussion is a fire mans connection for injecting extinguishing media into battery pack, but this requires risky activities very close to vehicle.
When will the mentioned report be available to Owners?	Those who wish to take part of the report may contact undersigned directly at martin.carlsson@stena.com.
	Comment: My expectation is that MSC wish to see within reach the completion of ongoing SSE work on RoRo space firesafety SOLAS Amendments, before starting new outputs on this topic. We need also walk in pace with knowledge development. Industry wish to see IMO regulatory track, possible with an early released guideline.

Charging of electrical vehicles

Question	Answer
When will charging station specification mentioned be available to Owners?	Hi, recommendations will be available at the end of LASH Fire (at the latest), my recommendations at this point is to look at the recommendations from the ALBERO-projects. Best regards Robert
This is interesting issues. Is may focus RoPax or will cargo vessels also be considered? BR Anders Tosseviken, DNVGL	Hi, the scope is Ro Ro Cargo, RoPax and vehicle carriers/PCTCs, Best regards Robert
Have you investigated the speed of charging of e-cars and risks related to it? Slow charging from 220V16A may be less risky than high speed.	Hi, as far as we know now, the amount of energy put in the system increases the risk, If there is a flaw in the cell/cable/plug. If the BEV is healthy it should not matter, but all systems wear down over time. Best regards Robert
Is the location of electrical vehicles on board the cardeck an issue due to the connection of the cable? (cable over the surface of the deck from the bulckhead to the car itself)	Hi Cable routing is always an issue, the length/placement of the socket on the BEV and the ships outlet, the trip hazard for all persons passing the BEV. Good cable management will be crucial. Best regards Robert

Charging of electrical vehicles

Question	Answer
Dear sis, some customers use to carry their VIP vehicles inside box containers. has this issue been dealt into the lash project?	Hi BEVs shipped inside containers is as of now considered (but the container could be rolled onboard on a flatbet/MAFI) as a BEV but rather a object that we will try to monitor with similar sensor techniques eg. IR cameras, since they will not be charged during the sea voyage. Best regards Robert
What's the maritime standard to use ?	Hi, as far as I know, there is no such standard in place, only recommendations, if you think about a standard for the charging station. Best regards Robert
Is there any more information on the "vehicle moved" signal in the communication protocol? Might it be that a car refuses loading start if it is "moving" as travelling on the vessel?	The “FAILED_EVShiftPosition” error code, only refers to the BEV gear shifter/drive mode, not being in "Parked" position.

Charging of electrical vehicles

Question	Answer
Is it really so that the customers want the cars being recharged during the journey? We don't refill the conventional cars either.	Hi, good point! But as Martin said, the argument can be, for the bigger picture it might lower the bars for transition to BEV, especially if the ships fuel source is fossil free or even zero emission. Please also see the three comments below! Best regards Robert
We do not fill the fuel tanks of internal combustion engines of vehicles on our car decks (we have plenty of diesel). Why are we even thinking about charging electric vehicles and all the risks and costs already mentioned?	Hi, I agree, but since one of the biggest draw backs of a BEV is the charging time, I believe BEV owners look for arguments to be able to charge their cars onboard during the sea vouyage. Please also see the two Q&A below! Best regards Robert

Charging of electrical vehicles

Question	Answer
Charging would be better offered at the Ports, not onboard, but the market dictates	Operators are in parallel to discussions of onboard charging evaluating port charging, has some important advantages to onboard option.
Comment: We already have charging points at our ports but still under pressure for onboard charging. These people also expect it to be free!	See above answer.

General overview of results of the Albero project so far

Question	Answer
With regards to the number of passages with various alternatively driven vehicles. Normally an operator doesn´t have such details on the cargo how did Stena gather such data?	We got the data from STENA. They already request these data during booking.
Standard ro-ro ferry sprinkler and handling! As Franz just mentioned in his introduction even high amount of water can´t extinguish the li-ion fire. So drencher shall be used for contaminating [containing] the fire and not for extinguishing it.	Standard "SOLAS" sprinkler systems on board this time are only sized to avoid spreading, not for extinguishing, even not for conventional cars. So the question is not, if the sprinkler will extinguish an EV but if it will hinder spread of an EVs fire. Tests should be made to check this. The problem so far is to develop a kind of exemplary test fire setting for such tests which has the typical features of an EV fire event.

General overview of results of the Albero project so far

Question	Answer
Will the dedicated positioning system affect the ship's stability?	Interesting question. We did not think over, yet. But after your question we did some research and learned by ourselves that an electric car is between 200 and 400 kg heavier than its conventional brother type. So, if there are some more dedicated places for EVs on board they should possibly been distributed in a balanced way on board.
Cooling in car deck is not a possibility. The tear and wear on a deck is to high so within very short the system will no longer work	The information we got from the ferry companies is, that a sprinkler system could run for ours. (Has anybody tried this already?) Most important thing would be to have good working drainage openings to let the water out again, otherwise you would possibly get a stability problem.
Could you share the real fire tests and the FSA?	Yes, I think this is possible to those who are interested. Please also follow our website, where we publish a lot of our result continuously.

General overview of results of the Albero project so far

Question	Answer
What is the risk profile for a gas powered trade vehicle (truck) carrying DG as cargo?	We did not focus on this question, yet, sorry. But Interesting question! Are there any "official" restrictions for the kind of DG-Cargo with respect to the kind of propulsion (fuel) of the carrying truck? If so, I would be interested in!!!
Which are the real cause of a possible TR on EV stowed on board?	Thermal runaway is mainly caused by damage of the battery pack and by overheating. So the main cause would be a damage which possibly happened before entering the ferry, e.g. by driving on uneven terrain. Overheating could take place e.g. by another fire nearby or by electrical failure, especially during charging process.
How does the study change in case of electric trucks/buses?	In my opinion main problems would be the same and the main risk control options as well, but possibly in another dimension.
Hi. What about new electric vehicles carried on a truck?	Special case, in this case the EV is a Cargo and as far as I know must be labelled as dangerous good.

What is the Regulator's view and how to best address APV at the IMO?

Question	Answer
In my mind one of the biggest problem today is that an operator can´t differ which car is an electrical driven car, which is a hybrid and which are driven by normal gasoline?	This is a valid point. This has also been one of our concerns for some time and we have taken actions to attempt to address this at EU level, so far without success. The LASH FIRE project will also investigate ways of solving this issue at port. Nevertheless, the measures to be taken in each of these cases should be then very clear too and at the moment these may differ significantly between operators or flag states.
A crew member on a ro-ro passenger ship has "only" the fire fighting education as required for a general cargo ship	Again this issue may be debatable. Indeed, if operators apply a compliance culture only, this may be true, however Part B of STCW recommends enhanced fire fighting, while for APVs the recently adopted Interim Guidelines also recommend appropriate training in relation the carriage of such vehicles.

What is the Regulator's view and how to best address APV at the IMO?

Question	Answer
Why doesn´t Sifis mention STCW as something to look into. Norman Atlantic and Sorrento showed that it was the way the incident was handled that let to the outcome of the fire.	Additional training or in general additional provisions in the STCW Convention has not been excluded and in the studies it has been considered in general as a 'low hanging fruit' in terms of implementation. The Norman Atlantic and Sorrento accidents and the eventual accident investigation reports brought up a number of issues and included a number of safety recommendations, none of them linked to training or the STCW. Nevertheless, in the methodology that IMO suggests to follow, i.e. a Formal Safety Assessment which include a risk analysis, single accidents are considered only as a part of a bigger picture. Appropriate probabilities are assigned and the rick control options are evaluated accordingly.

What is the Regulator's view and how to best address APV at the IMO?

Question	Answer
Referring to the interim guidelines, chapter 4.2, vehicles spaces and ro-ro spaces should be either closed ro-ro spaces or weather decks. What's EU's position om this?	The EU supported the closure of openings. It should be noted that this was supported by several EU Member States, since notable accident investigation reports included this as a safety recommendation, while the FIRESAFE II study found it only partly cost effective. however, since the relative risk reduction was significant (it provides benefits to detection, fire extinguishment, containment and the evacuation stages), it was decided to proceed with this proposal which was adopted in the Guidelines. Nevertheless, it should be noted that for APVs the picture might be different since in case of fire of electric vehicles (Li-Ion batteries), ventilation is recommended.

What is the Regulator's view and how to best address APV at the IMO?

Question	Answer
Very well summarized Sifis. I could not have better done it. We should also remember that COVID-19 had a huge impact on the normal scheduling of IMO meetings. The Committees are prioritizing their work to fit in with online meeting programme. So, the legislative process at IMO might be even slower now.	Thank you very much! Indeed we are aware of this and are following the latest developments on the situation. The point in the presentation was also that we expect two additional big items to end up for the consideration of the Fire Protection Working Group in the near future which might delay this process even further.

Comment

"For your information RelyOn Nutec has just finalised a White paper on this topic and implemented it in STCW Safety Training Courses. We are more than happy to share the white paper, free of charge of course. [...] if there is interest in this Whitepaper "Incident Response Guidance for E-Vehicle on a Ship" please share my contact details to the attendees of this conference: sv@nl.relyonnutec.com or +31(0)652588749, They can send me an email and will forward the white paper to them. Regards Stefan Vis RelyOn Nutec"