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**SAFER, CLEANER,  
MORE EFFICIENT**

Electric car fire in an underground garage. Courtesy of Fire and Rescue Department of the Capital City of Prague. Computer translated from Czech language Nov 2023





## Electric car fire in an underground garage

Incident Date: 4. 5. 2023 @ 23:56

Location: Praha 2, Bělehradská 299/132. Czech Republic

Original edit by: por. Mgr. Havrda Jan

Release Date: 25.5.2023

Updated: 28.5.2023

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Translation by: M. Orman – Cold Cut Systems; Nov 2023

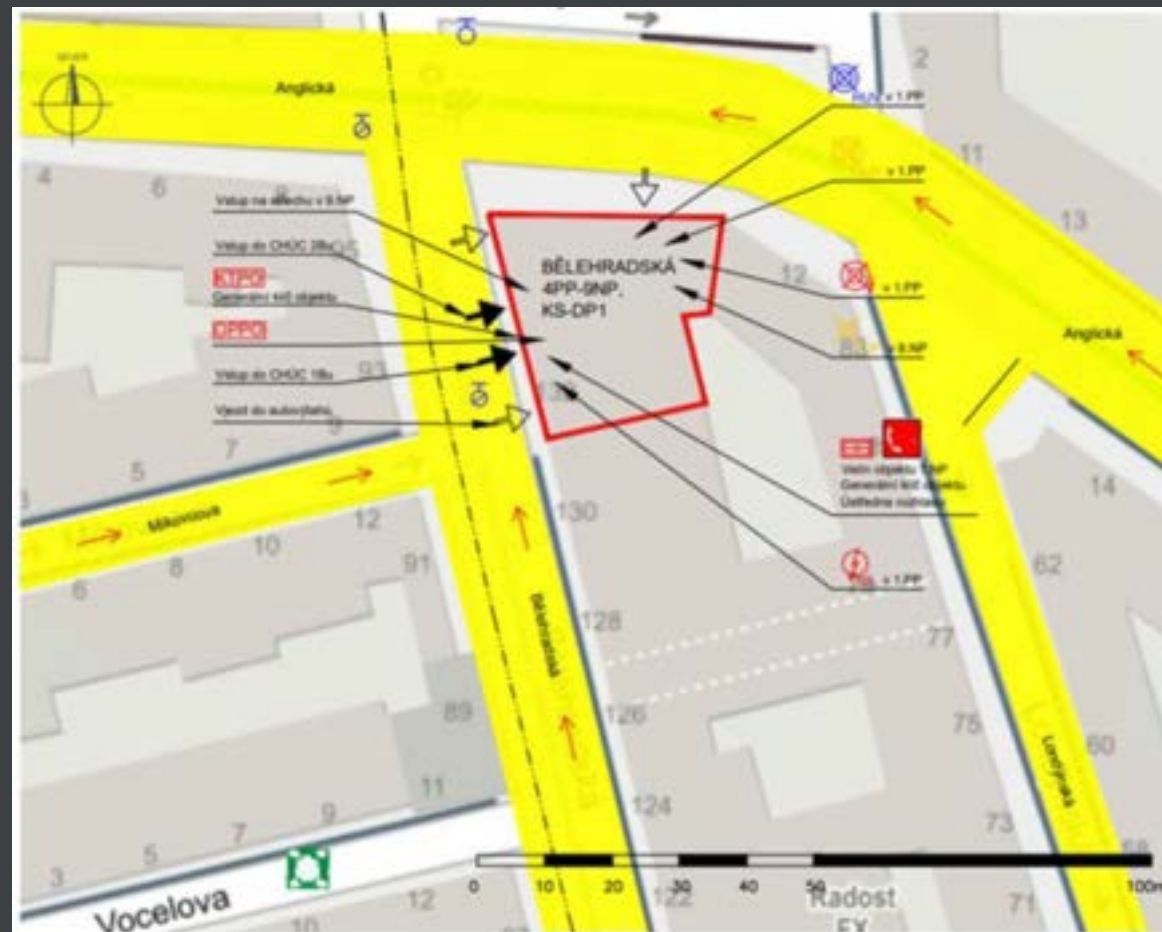
Contact: [info@coldcutsystems.com](mailto:info@coldcutsystems.com)

Approved for circulation by: Col. Jaromir Piesch Dec 2023



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## Incident Location



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Incident Location



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Incident Location



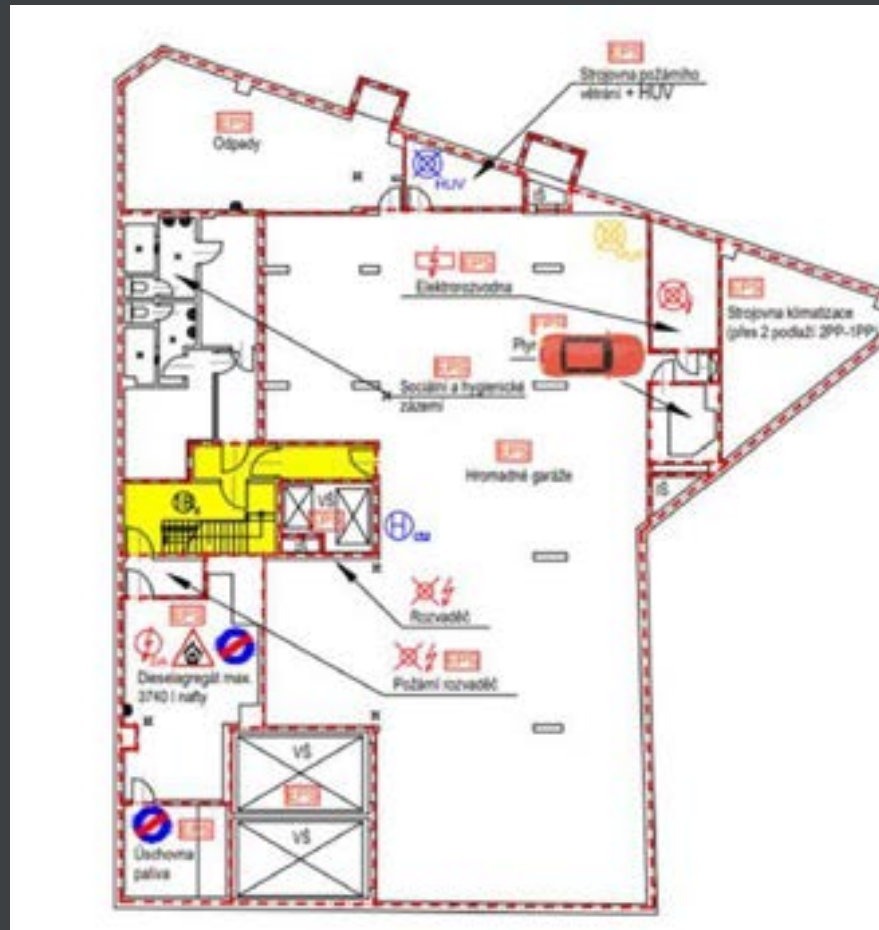
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Incident Location



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# Incident Location





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Jaguar i-Pace



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## Jaguar i-Pace - Technical Data

- SUV CONSTRUCTION: 4,682 x 1,895 x 1,565 mm, 2,133 kg
- DRIVE: Electric, driven axle: 4×4
- POWER: 294 kW, 400 hp, torque: 696 Nm
- BATTERY: 90 kWh (84.7 kWh usable capacity)
- CHARGING: Fast charging: 100 kW, onboard: 11 kW,

Thanks to three-phase charging, up to 53 km of range can be charged in one hour. From complete zero, the car's batteries are then recharged to their maximum capacity in less than 9 hours

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## Rescue Sheet



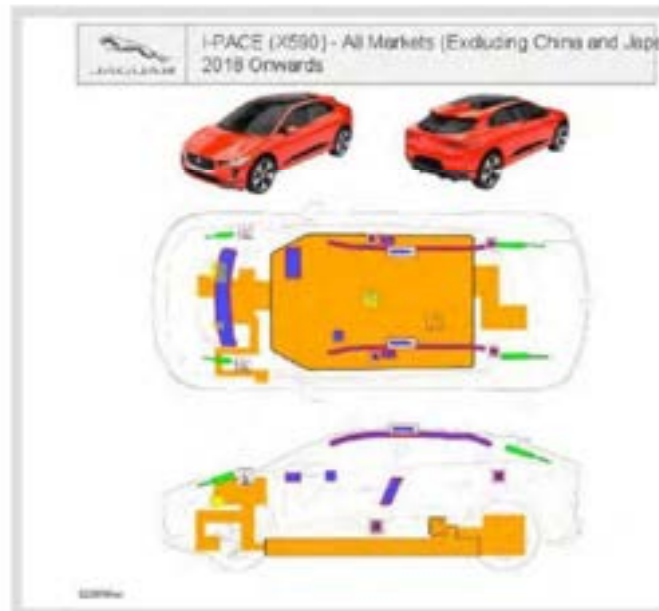
### GENERAL INFORMATION

#### FIRST RESPONDER 2018-2019

DESCRIPTION AND OPERATION

RESCUE SHEET

All Markets (Excluding China and Japan)



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# Battery Information



## JAGUAR I-PACE ELECTRIC PERFORMANCE

### 90kWh BATTERY

The battery is made up of 432 high energy density Lithium-ion pouch cells arranged in 36 modules of 12, the best technology to deliver maximum range, performance and efficiency.



### SINGLE-PEDAL DRIVING

The I-PACE's sophisticated braking system provides regenerative charging power to the battery in all driving modes - maximising range. And, by selecting the 'high' regenerative mode, it enables intuitive 'single pedal' driving in many conditions. Regenerative braking can produce up to 0.4G of braking force.

OR TO:  
**470km**  
(292 miles)  
RANGE ON THE  
WLTP TEST CYCLE

### 100kW DC RAPID CHARGING

15 MINUTES CHARGING AT 100kW DC GIVES  
UP TO 121KM (75 MILES) EXTRA RANGE



### TWO ELECTRIC MOTORS

The Synchronous Permanent Magnet motors are light and extremely efficient. Packaging them concentrically with the single-speed transmissions makes them as compact as possible. Their position on each axle delivers all-wheel drive and, together with the underfloor battery, contribute to I-PACE's low centre of gravity to enhance control, handling and agility.



### 36kNm/<sup>o</sup> TORSIONAL RIGIDITY

The integral battery structure means I-PACE is the stiffest vehicle in the Jaguar range - optimising handling, agility and safety.

### 11KW WALL BOX

Charges the battery  
from 0-100% in 8.6 hours  
- ideal for overnight  
charging at home



**696Nm** | **4.5s** | **400PS**  
TORQUE | 0-60mph | POWER

#IPACE



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# Incident Timeline



23:56

- reporting an event to the monitoring station, triggered sensor on the 2nd underground floor

23:57

- departure of the Central Fire Station (CHS) Praha - Sokolsky unit (2x CAS20/2000/120-S1R/Cobra, 1x AZ30-M1Z 30m metre ladder)

00:01

- arrival of the CHS Praha - Sokolská unit at the scene of the intervention – it was returning from the intervention

00:02

- arrival of the CHS Praha Sokolská unit at the scene of the intervention – it was leaving the base

00:03

- the unit has contacted the permanent security of the building (they do not know what is going on)

- EPS (Electrical Fire Signal) survey on the 2nd underground floor with a negative result,

00:06

- Smoke was detected on the cameras on the 1st underground floor,

- A survey of these areas revealed white fine smoke coming from an electric car connected to the charging station and visible damage to the traction battery,

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# Intervention Timeline



00:08

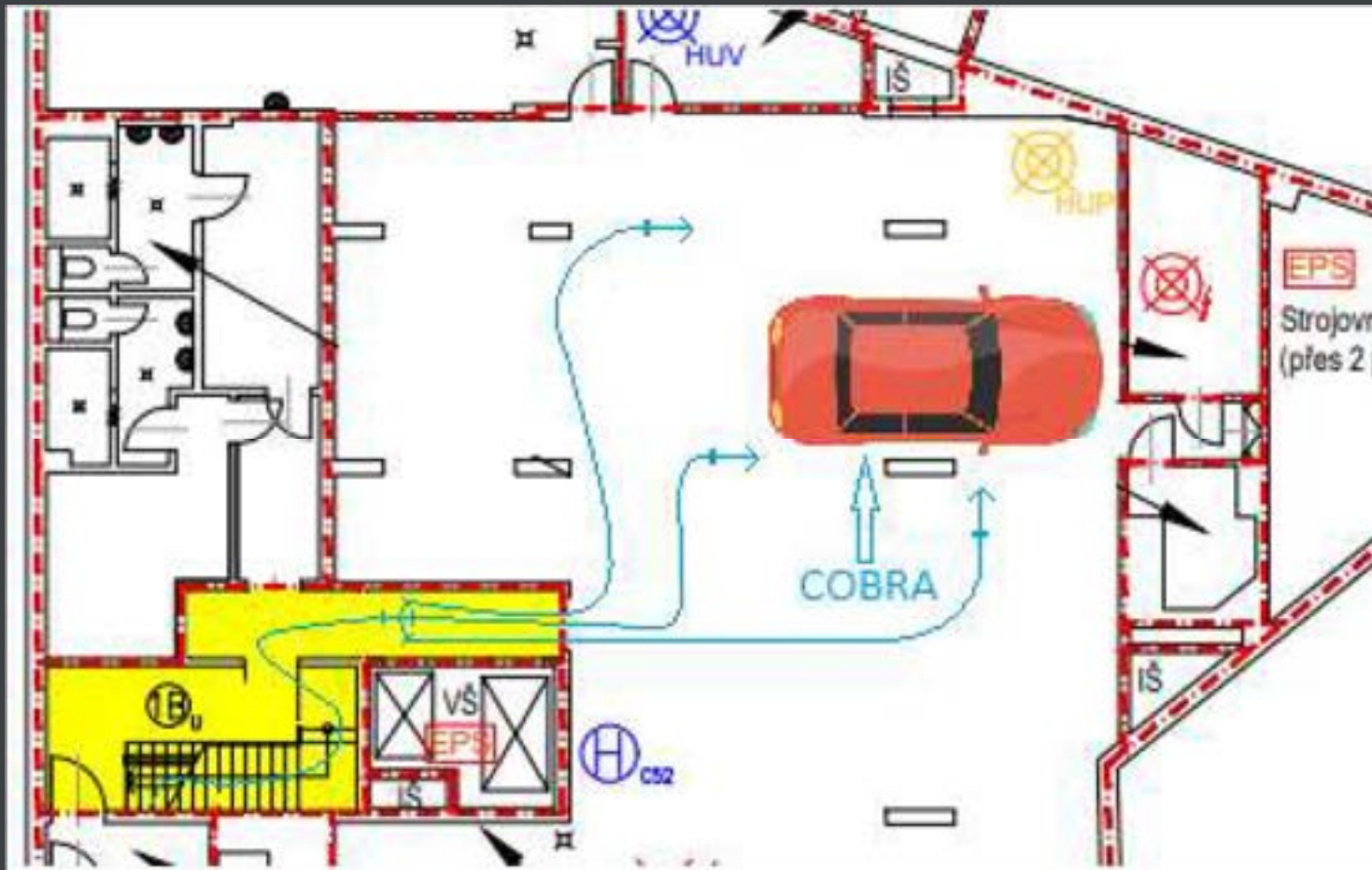
- explosion in the chassis part of the EV,
- immediate increase in smoke production,
- flaming burning,
- manual disconnection of the charging rectifier of the car from the electric networks,
- combat development, creation of a transport line 1 x B 75mm with a distributor and deployment of 2 x C42 mm,
- zero visibility,
- orientation possible only with thermal cameras,

00:09

- request for reinforcement units (VA-L2Z Incident Commander, 2x CAS20/2000/120-S1R, 1x CAS30/11000/1000-S3LP, Chemical Service TA-L2CH/ODCH),

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# Situation Drawing



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# Intervention Timeline



00:11

- effort to disconnect the building from electricity energy (electrical switchboard in 1<sup>st</sup> underground floor blocked by burning by vehicle), during the intervention the VZ decided not to disconnect the building from the electricity. Energy (motion elevators)

00:12

- installed smoke extractor from underground spaces - low effect

00:13

- 2nd grade PP announced,

00:15

- arrival of Incident Commander (VDS),

00:17

- arrival of reinforcement units at the site of the intervention Fire Station (HS) - Holešovice, HS - Strašnice),



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# Intervention Timeline



00:18

- command of the intervention is taken over by VDS Lt. M.Sc. Jan HAVRDA,

00:20

- 3 x fire hose C-52 or 42mm, installed underground,
- COBRA high-pressure cutting equipment deployed,

00:23

- arrival TA-L2CH/ODCH Hazmat truck, CBRN lab and measuring equipment
- measurement and sampling started,

00:32

- preparation of a container for extinguishing EVs

at HS - Holešovice,

00:35

- request for additional reinforcement units (2x CAS2/2000/120-M1Z, ODCH with PPLA (PPLA = truck with spare BA cylinders),
- after reaching a sufficient number of SaP, a survey was carried out in the above-ground floors (previously Incident Commander was informed by security that the building was empty),

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# Intervention Timeline

00:45

- taking the elevators out of emergency mode in the EPS control panel,
- the decision of the General Assembly on the emergency transport of the elevator to the 4th level underground,
- sticking optical barriers = unblocking the elevator in this level,
- this ensures the removal of combustion fumes,
- replacement of exhaust fume extractors with overpressure ventilation for better smoke removal,

01:13

- flame burning extinguished,
- an electric car raised using the AKU HVZ to access the batteries,
- reinforcement units VYA-L1Z from CHS and KHE (container for the EV) + ANK13-S3 (truck for transporting containers) from HS - Holešovice,
- loading EVs onto transport carts,

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CAS20/2000/120-S1R/Cobra



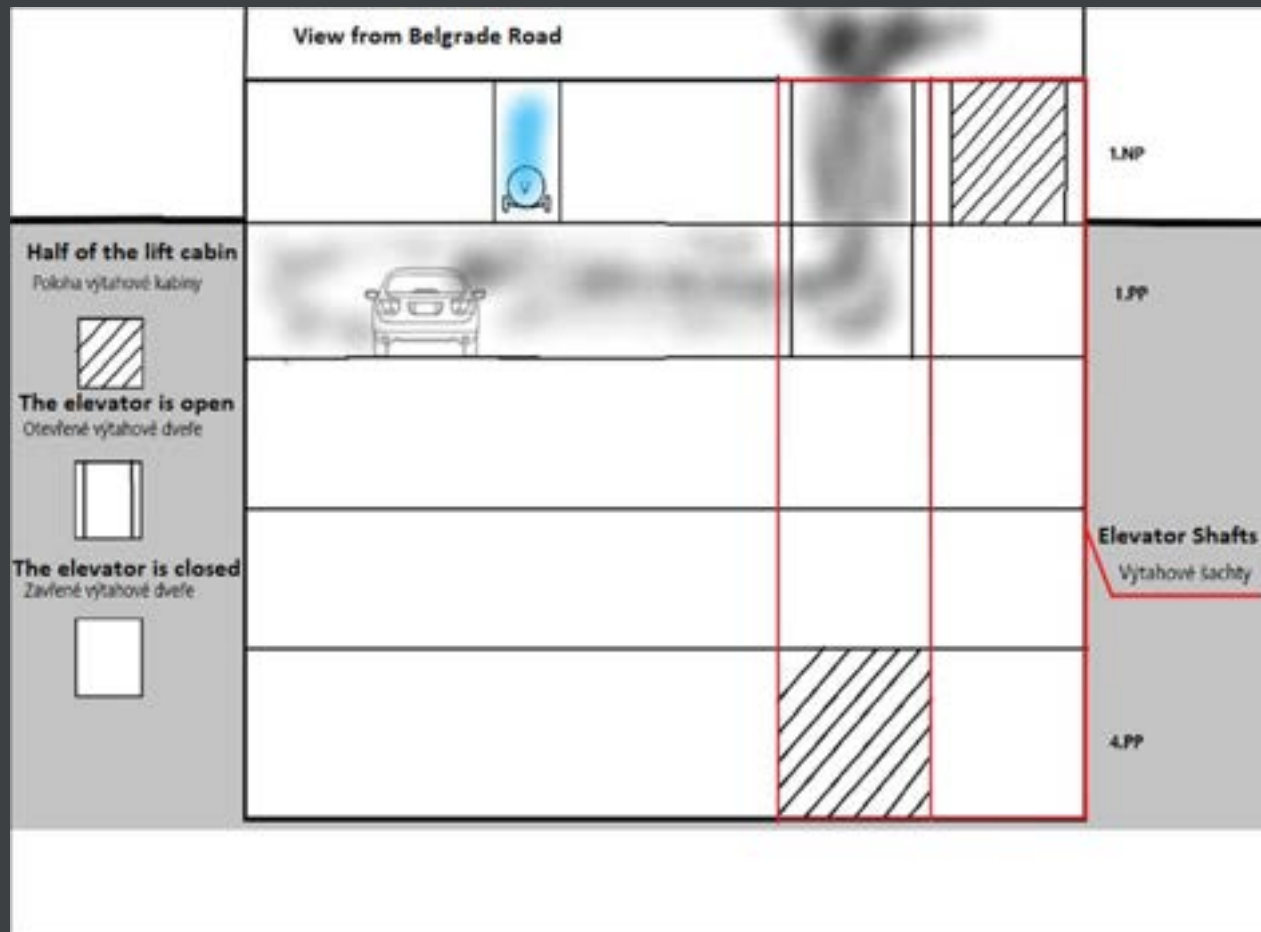
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VYA-L1Z



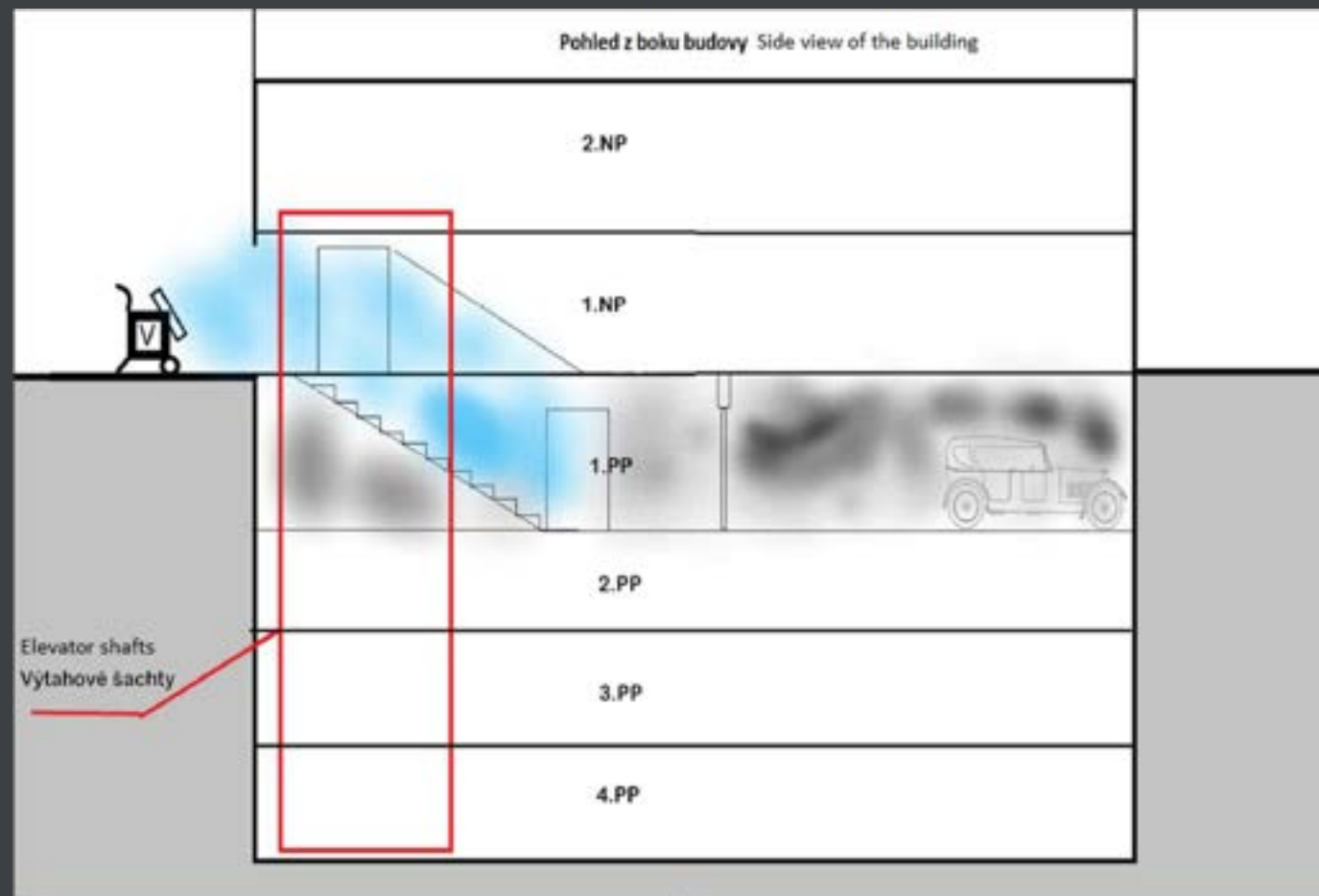
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## Intervention process - ventilation



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## Intervention process - ventilation



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## Intervention Timeline



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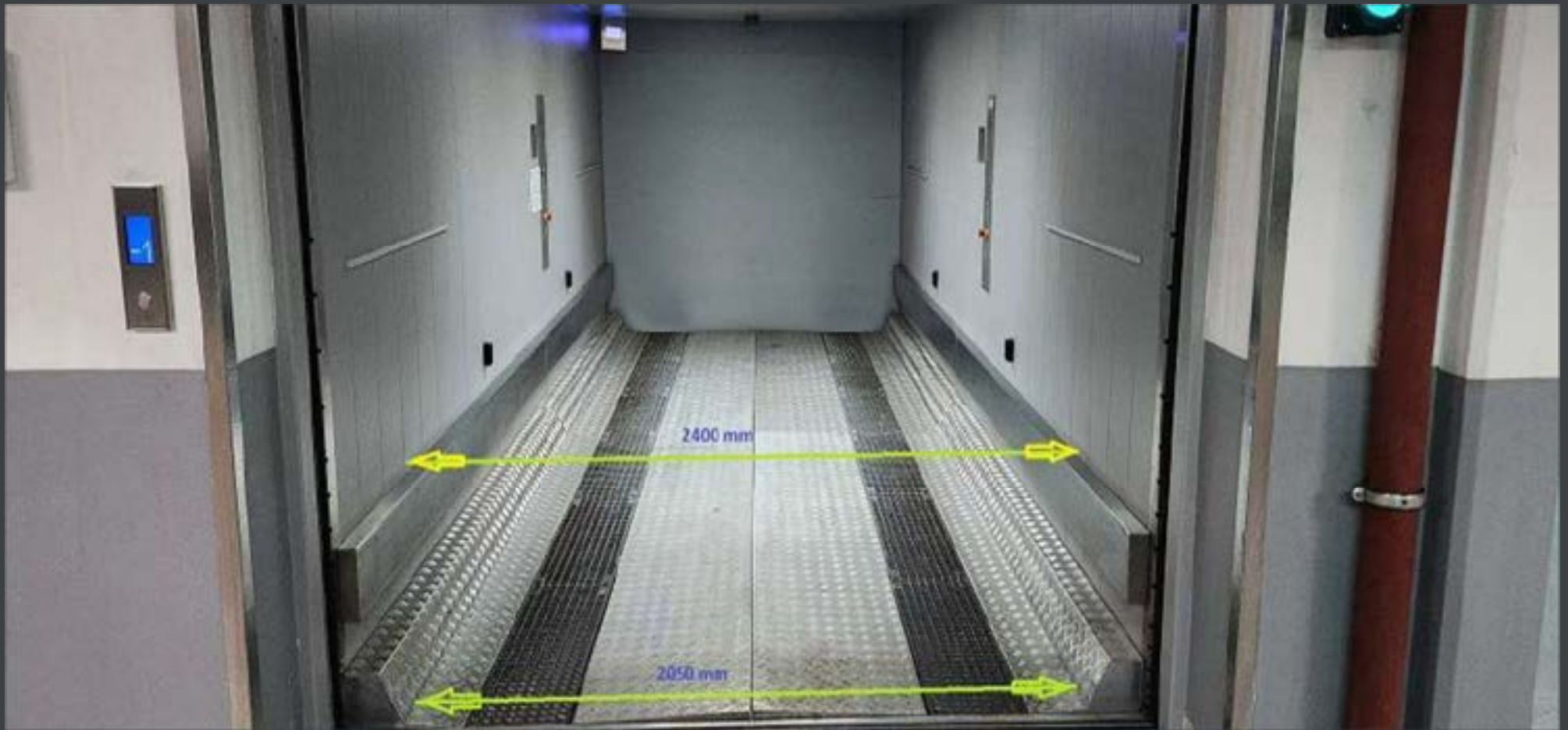
## Intervention Timeline





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# Intervention Timeline



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# Intervention Timeline

02:04

- the electric car was transported to the lift, the EV was checked repeatedly thermal camera
- Incident Commanders decision on the need to send four service members by lift (who were equipped with additional breathing apparatus (IDPs) and hand held fire extinguishers, (each on one corner of the vehicle),
- elevator controlled in an emergency from the elevator cabin,
- before the actual transport, another inspection of the vehicle with a thermal camera,
- use of overpasses to compensate for the height difference between the cabin elevator and floor 1<sup>st</sup> level underground,

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## Intervention Timeline



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# Intervention Timeline



02:10

- lift cabin open on the 1st floor level,
- using the VYA-L1Z electric car pulled out of the lift,
- electrolyte was leaking from the vehicle's battery all the time communication.



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## Intervention Timeline



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# Intervention Timeline

02:32

- loading the electric car into the container using a hydraulic arm,
- its stabilization carried out,

02:35

- covering the leaked electrolyte with an absorbent,
- subsequent collection of the absorbent
- flushing the entire affected area with water
- negotiated a suitable place to place KHE (container) with EV with regard to the open event,

03:01

- departure of KHE to the SŽ campus,

03:28

- container folded and flooded with water 8 m<sup>3</sup>

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# Intervention Timeline



11:12 a.m

- thermal camera check negative,

5:04 p.m

- measurement with a thermos camera measured up to 30 °C,

5/5, 5/6, 5/7, 5/8

- sampling and their analysis,
- checking the condition of the electric car – everything is stable,

12. 5.

- pulling the vehicle out of the container,
- loading for towing service,
- thermal camera check negative,
- the vehicle handed over to the owner's representative,

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## Incident Timeline



Position of the EV in the container (KHE) before transport – secured the vehicle against movement.



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Incident Vehicle with KHE (water container)



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# Findings from the intervention

- car fire detected by EPS (Electrical Fire Signal)
- a very large object with a complex orientation in the DZP. Operational cards in A4 format confusing and too small scale. DZP (fire plan) (46 pages, 1 floor one A4),
- the flaming fire did not occur until the arrival of the fire brigade,
- an electric car connected via an inverter to a 380 V socket, this was not a standard electric vehicle charger = it was possible to pull it out of the socket,
- it would be advisable to disconnect all chargers from a central point on that floor
- 17,000 litres of water was used in the attack on the attack line,
- 2,000 litres on the high-pressure COBRA fire extinguisher,

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# Findings from the intervention



- the COBRA fire extinguisher does not provide sufficient protection for the operator – it is necessary to have a water jet to cover firefighters from the start of COBRA deployment in the immediate proximity.
- Damaged protective suit of member who used COBRA.



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# Findings from the intervention

- need to have all carts with swivel wheels and locking,
- the underground floor was full of dangerous fumes of smoke from vehicle batteries and contaminated firefighting water, we do not know what the responders absorb into their bodies by skin = think about taking samples from direct impacting bodies after the end of the intervention,
- 4 firefighter suits have been sent for analysis,
- one responding member suffered from nausea and pain between shifts head, the following shift was sent to the ÚVN (hospital in Prague) for examination (connection with was not proven by the intervention),

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# Negative effects of intervention

- insufficient load capacity of the carts, one cart has a load capacity of 510 kg and is useful vehicle weight 2266 kg,
- etching of the wheels on the auxiliary chassis,



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## Negative effects of intervention

- insufficient width of the lift cabin, unsuitable for transport use trolleys, emergency control of elevators from the cabin, impossibility to stop in the same level with the floor, damage to the transport trolley during attempts to drive up to the elevator, the need to purchase access ramps,
- absence of emergency control of the vehicle lift in the event of a fire – EPS stated elevators to the described mode, it was not possible to operate the elevator further, for example to create a ventilation hole or to transport a vehicle to the surface,
- absence of access ramp equipment for overcoming height differences,
- the elevator system was the only access route for cars to lower floors,

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# Negative effects of intervention



- inappropriate access ramps to the electrical container (KHE), ribbing and insufficient attachment of ramps,
- absence of anchoring eyes for anchoring the transported OA inside on the back side container,



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## Negative effects of intervention

- it is not possible to leave a container anywhere in the city, communication before the building was busy, including tram traffic,
- it is not possible to transport the vehicle in any other way – there is a constant flow of chemicals from the vehicle.
- corrosive substances escape when handling the vehicle,
- elevator shafts and the lower floor were flooded with contamination fire water,
- due to the fire of the traction batteries of the electric car, the premises filled with smoke very quickly.
- there is no device for fire ventilation and local performance. In the building, the installed ventilation is insufficient.



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## Negative effects of intervention

- at the time of the transfer it was an open event = it can be assumed different interests of interested parties (unclarified facts of the parties owner, car dealer, insurance company, the police and ambulance),
- the EV container must be guarded 24/7
- the risk of handling EV container drain valves,
- the risk of a person falling into a contaminated environment,
- restriction of access to the container with regard to security,
- dangerous character

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Negative effects of intervention



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## Conclusions



- the Cobra high-pressure cutting device can be placed on the chassis of a pick-up truck with the option driving into underground garages,
  - increase the number of KHE in the territory of Hl. city of Prague, minimum condition 3 pcs.,
  - equip the KHE construction with anchor points in the rear part to ensure transport EV,
  - different design of handling carts under EV wheels, focus on load capacity, width and manoeuvrability, the ideal option is not to exceed the floor plan of the vehicle and possibility of filming all wheels + locking,
  - equipped with approach ramps for overcoming height differences,
  - equipped with crossing plates for overcoming unevenness and holes,
- the wheels of handling carts must be made of durable materials acids and bases,

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## Conclusions

- ensuring sufficient protection of firefighters working with Cobra (cooling),
- equipping the units with hoods against the penetration of aerosols of harmful substances,
- the possibility of decontamination by undressing the member at the scene of the intervention a prevention of secondary contamination,
- decontamination of emergency footwear,
- detailed washing and decontamination of the emergency helmet,
- the wheels of handling carts must be made of durable materials acids and bases,