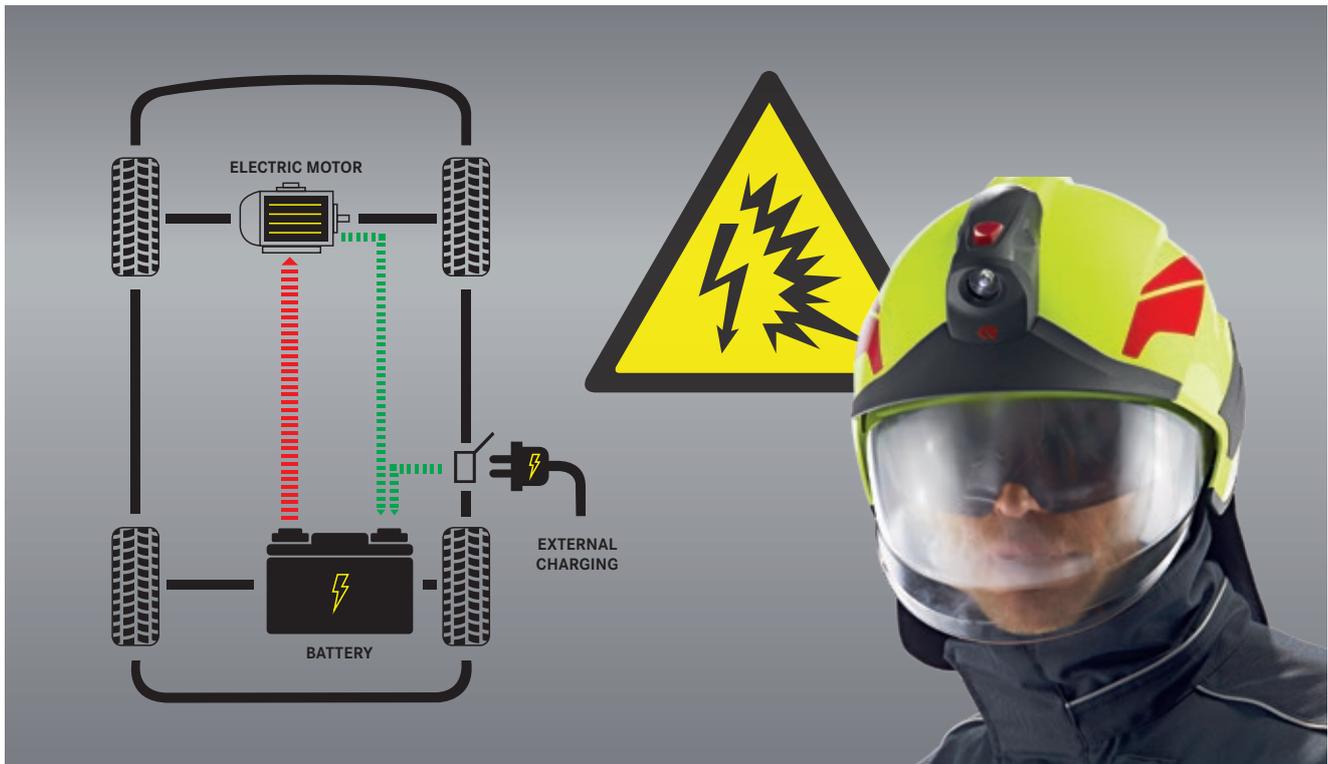


E-mobility

Dangers - Risks - Protection for firefighting operations.



The share of fully and partially electric vehicles has risen sharply. Electric drives in various forms will dominate the picture on our roads in a few years. More than 70 % of firefighting operations are of a technical nature, a large proportion of which are related to road traffic accidents.

Rescue and recovery from/of vehicles with new drive technology

Vehicles with new drive technology (hybrid, all-electric) use electrical systems with very high voltages of 400-900 V. High-voltage batteries are usually installed in the rear near the ground. Special high-voltage cables (usually easily recognizable by the color orange) transmit the energy to the electric motor.

In the case of electric vehicles involved in an accident, but also when towing, particular care must be taken to ensure that these cables are not touched, cut, crushed, or pulled off. It is essential to disconnect the power supply from the battery to the motor/engine before starting the rescue/recovery.

Since the separation systems are different and can change, the current emergency guidelines on the homepage of the respective apparatus manufacturer should be referred to.

Risks/dangers

What are the risks/dangers posed by electricity in the fire fighting sector in general and by the rapid development of e-mobility in particular?

In electrical systems, an electrical arc or fault arc is a technically undesirable arc occurring between electrical system parts. This can lead to severe burns due to lightning-like, extreme heat build-up and possible liquid metal spatter if the protective equipment is inadequate.

Electric shocks when touching live conductors can cause life-threatening cardiac arrest, ventricular fibrillation, and irreversible cell damage.

Leaking liquids, chemicals, battery acids, and the like pose an additional risk.

How these risks are covered in PPE standards

Parts of the PPE	Dangers	Standards/tests
Firefighting helmets/visors	Protection against electrical shocks	EN 443:2008 (4.12) EN 14458:2018 (5.2.9)
	Electrical arc	GS-ET-29
	Protection against molten metals	EN 443:2008 (4.9)
	Contact with liquid chemicals	EN 443:2008 (4.13) EN 14458:2018 (5.2.12)
Protective clothing	Electrical arc	IEC 61842:2018
	Protection against molten metals	EN ISO 11612
	Anti-static	EN 1149-5:2008
	Contact with liquid chemicals	EN 469:2005 (6.10.2)
Firefighting boots	Protection against electrostatic discharge	EN 15090:2012 (6.6.3)

Helmets/visors

EN 443 (firefighting helmets) and EN 14458 (visors) also describe, among others, requirements and tests for assessing electrical insulation and protection against liquid metal spatter and chemical substances.

Good basic protection against accidental contact with electrical conductors is ensured here by testing in the voltage range up to 1,200 V. In any case, this is also an enormous safety gain for the emergency crews compared to the metal helmet shells used in the past.

The danger from electric arcs is not covered in the EN 443 and EN 14458 standards. To be able to cover this risk, it is strongly recommended to make sure that helmets and visors additionally meet the requirements according to GS-ET-29 (Testing and Certification of Electricians' Face Protection). Correspondingly tested helmets/visors provide a high level of protection for the head, face, and eyes in the event of electric arcs.

Protective clothing

The electric arc test for protective clothing is described in IEC 61842:2018 (box test). In class 2 (test current 7 kA), the thermal energy acting on the inside of the protective clothing is measured and recorded over time.

EN ISO 11612 Code E specifies protection against the penetration of liquid iron spatter with a temperature of approx. 1,400 °C. During such a test, there must be no change or damage to the innermost layer.

The clothing according to EN 1149 protects emergency crews, products and the working environment from the consequences of electrostatic discharge. Electrostatic discharges can lead to explosions and their serious effects in the respective environment.

Which Rosenbauer PPE offers protection against special hazards caused by electricity



Rosenbauer has set itself the target of developing perfectly coordinated PPE and thus minimizing the risk for the emergency crews.

Firefighting helmets

Dangers	Standards/tests	Tested helmets
Electric shocks	EN 443:2008 (4.12) EN 14458:2018	HEROS Titan / HEROS H30 / HEROS Smart
Electrical arc	GS-ET-29	HEROS Titan / HEROS H30
Protection against molten metals	EN 443:2008 (4.9)	HEROS Titan / HEROS H30 / HEROS Smart
Contact with liquid chemicals	EN 443:2008 (4.13)	HEROS Titan / HEROS H30 / HEROS Smart



HEROS helmets/electrical arc testing
No structural damage, head and face area well protected.

Testing with molten metal

E-mobility

Dangers - Risks - Protection for firefighting operations.



Protective clothing

Dangers	Standards/tests	Tested protective clothing
Electrical arc	IEC 61842:2018 Class 2	FIRE MAX 3 and FIRE FLEX
Protection against molten metals	EN ISO 11612 Code E	FIRE MAX 3 and FIRE FLEX
Anti-static	EN 1149-5:2008	FIRE MAX 3 and FIRE FLEX



FIRE FLEX protective suit/electrical arc testing
No structural damage, body incl. neck area well protected.

Firefighting boots

Dangers	Standards/tests	Tested firefighting boots
Protection against electrostatic discharge	EN 15090:2012 (6.6.3) (anti-static shoes)	BOROS B1, BOROS B4, TWISTER, TORNADO, TWISTER-cross, AUSTRIA



Special equipment*

510302	Electrician's gloves	20,000 V
510410	Insulating blanket	20,000 V
511000	S-shaped rescue hook	30,000 V

*For special operations, the use of highly insulating special equipment can be expedient.