

Risk Analysis for Electrical Switches for Vehicle Installation in Compliance with the General Product Safety Regulation (GPSR)

Prepared for:

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1. Introduction

This risk analysis concerns electrical switches designed for installation in vehicles. Special attention is given to the requirements of the General Product Safety Regulation (GPSR), effective from December 13. The switches are partially delivered as kits, requiring the customer to perform mechanical adjustments (e.g., drilling holes) and electrical connections. The analysis aims to identify potential hazards, assess risks, and propose measures for risk mitigation to ensure product safety throughout its lifecycle.

2. Identification and Assessment of Hazards

2.1 Mechanical Hazards

1. Risk from sharp edges or small components:

- **Risk:** Cuts or puncture injuries during mechanical adjustments, especially when drilling holes.
- **Assessment:** Moderate.
- **Measures:** Rounding of component edges and providing safety instructions in the installation manual.

2. Improper attachment of switches:

- **Risk:** Switches may loosen during driving, leading to malfunctions or accidents.
 - **Assessment:** High.
 - **Measures:** Supplying mounting materials with sufficient stability and an illustrated installation guide.
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2.2 Electrical Hazards

1. Overloading the switches:

- **Risk:** Exceeding the maximum current load may result in short circuits, overheating, or fires.
- **Assessment:** High.
- **Measures:** Clear labeling of maximum current capacity and providing information on compatible fuses and wire gauges.

2. Incorrect wiring:

- **Risk:** Faulty wiring could cause malfunctions or damage to vehicle components.
- **Assessment:** Moderate to High.
- **Measures:** Color-coded or clearly marked connections and detailed wiring diagrams in the manual.

3. Contact with live parts:

- **Risk:** Electric shock during installation.
- **Assessment:** Moderate.
- **Measures:** Insulation of all electrical components and warnings in the manual.

2.3 Chemical Hazards

1. Material outgassing at high temperatures:

- **Risk:** Release of volatile organic compounds (VOCs), particularly in enclosed vehicle cabins.
- **Assessment:** Low.
- **Measures:** Use of tested materials compliant with REACH and RoHS standards.

2. Hazards from adhesives or lubricants:

- **Risk:** Skin irritation or allergic reactions.
- **Assessment:** Low.
- **Measures:** Providing safety data sheets and recommendations for appropriate protective equipment.

3. Analysis of Potential Risks During Use

1. Intended Use:

- Installation and use of switches according to specifications.
- **Risk:** Low when used correctly.

2. Foreseeable Misuse:

- Use of switches with excessive current, improper installation, or insufficient insulation.
- **Risk:** High.
- **Measures:** Providing clear installation instructions and warnings about potential dangers from misuse.

4. Consideration of Specific Requirements and Standards Under GPSR

4.1 Labeling Requirements

- **Product Labeling:** Manufacturer name, product designation, serial number or batch code, CE marking.
- **Warnings:** Information on maximum current load, protective measures, and installation requirements.

4.2 Traceability

- **Requirements:** Documentation of all production batches and supply chains.
- **Measures:** Implementation of a traceability system to quickly locate and identify products in case of recalls.

4.3 Safety Documentation

- **Technical Documentation:** Providing complete documentation to demonstrate compliance with all relevant EU harmonization regulations.
 - **User Manual:** Clear and detailed instructions in the official language of the sales region.
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5. Assessment of Compliance with EU Harmonization Regulations

The product must comply with the following requirements:

- **Low Voltage Directive (2014/35/EU):** Ensuring electrical safety.
 - **EMC Directive (2014/30/EU):** Ensuring electromagnetic compatibility.
 - **REACH and RoHS:** Compliance with material-related chemical safety standards.
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6. Proposals for Risk Mitigation

1. **Design Optimization:**
 - Development of user-friendly and safe-to-install components.
 - Ensuring all electrical components are designed for maximum load capacity.
2. **Enhanced User Information:**
 - Detailed, illustrated manuals.
 - Clear warnings on current capacity and correct wiring.
3. **Testing and Certification:**
 - Conducting independent tests according to harmonized standards.
 - Certification of the product by a notified body.
4. **Traceability System:**
 - Implementing a system to document production batches and supply chains.
5. **Training and Support:**

- Providing online training or support videos for end customers.

7. Conclusion and Recommendations

Electrical switches pose a moderate risk when used correctly. By implementing the proposed measures, product safety can be significantly improved, and full compliance with GPSR requirements can be ensured.

We recommend:

- Reviewing and optimizing installation instructions.
- Ensuring compliance with all relevant EU directives.
- Conducting regular quality and safety tests.

Ampire Electronics GmbH & Co. KG is thus well-prepared to meet the requirements of the GPSR and ensure consumer protection.

Best regards

Ampire Electronics GmbH & Co. KG