RQA RISK ENGINEERING REPORT

Electric Vehicle Safety and Recall Risks

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This RQA Risk Engineering Report was prepared by one of RQA Group's Principal Consultants for Automotive Risk who was until very recently, head of all global activities regarding product recall, product liability case management, fire/crash investigation, major incident management and future product integrity for a global vehicle manufacturer.

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Electric Vehicle Safety and Recall Risks

1. Executive Summary

This report outlines the primary safety risks which could lead to a product recall of both full Electric Vehicles (EV) and Hybrid Electric Vehicles (HEV). It particularly covers those components or systems that are unique to these products. This report does not cover the recall risks associated with those components and systems that are common to traditionally powered vehicles.

Electric vehicles are often in the media and public eye. Their appearance, performance and reputation has improved markedly in only a few years. Most major car manufacturers now produce an electric or hybrid range and sales are increasing. They also form part of governments' environmental policies across many territories. Like Internal Combustion Engine Vehicles (ICEVs), EVs suffer from product recalls and safety incidents. Some recalls are high profile and videos of electric cars on fire are widely shared on social media. The risks of Lithium ion batteries are well reported, but how do these risks manifest themselves in EVs? What other risks are present, not related to batteries? What characteristics of EVs present lower safety risk than ICEVs?

In order to get to a better understanding of the recall and safety risks that EV's pose, this report focuses on what can go wrong with EVs and where in the supply chain these risks arise. It considers faults that emerge once in the hands of the end user, which are likely to result in product recall and/or product liability claims as well as discussing faults that can occur during service maintenance, vehicle assembly, storage and distribution. We also look further back in the supply chain at battery component manufacture and assembly.

The report highlights the four primary safety related risks that could lead to a recall and considers the exposure of each during the various supply chain stages and lifetime of the electric vehicle.

These risks are:

- Fire
- Electrocution
- Unintended vehicle motion
- Loss of drive while in motion

Mitigation of these risks for specific situations is discussed.

This report is of relevance to insurance underwriters and claims teams covering recall, liability, property, fleet, and others as well as risk managers in the automotive field.

2. Introduction to EV Risks and Recalls

The fundamental principles of good component and software design, testing, manufacturing, and vehicle assembly, are as important to Electric Vehicles (EVs) and Hybrid Electric Vehicles (HEVs) as they are with traditional Internal Combustion Engine Vehicles (ICEVs). Much of what the initial design engineers commit to "paper and drawing" will determine the performance of the product in the hands of the end user, good design assists with both component manufacturing and vehicle assembly.