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**Requirements of implementation of motor vehicle products
recall based on over-the-air update technology**

基于远程升级技术的汽车产品召回实施要求

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Requirements of implementation of motor vehicle products recall based on over-the-air update technology

1 Scope

This document establishes the implementation procedures for recall activities and technical service activities based on over-the-air update technology. It stipulates the overall requirements, filing requirements, recall activity implementation process requirements and recall effect evaluation requirements.

This document applies to product recall activities and technical service activities carried out by automobile product manufacturers based on over-the-air update technology.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 34402-2017, *Safety of motor vehicle product -- Guidelines for risk assessment and risk control*

GB/T 39603-2020, *Guidelines for the Recall Effectiveness Evaluation of Defective Motor Vehicle Products*

GB/T 43387, *Product recall - Vocabulary*

GB 44495-2024, *Technical requirements for vehicle cybersecurity*

GB 44496-2024, *General technical requirements for software update of vehicles*

GB/T 45496, *Motor vehicle product recall -- Guidelines for information defect assessment*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 39603-2020, GB/T 43387, GB 44496-2024 as well as the followings apply.

3.1 software

emission hazards in already sold automotive products through over-the-air update.

3.8 technical service activities based on over-the-air update technology

The process by which manufacturers provide technical solutions to non-defect issues for already sold automotive products through over-the-air update.

3.9 update scope

The boundary involved by over-the-air update to solve problems, add new features or improve performance.

NOTE: For example, product production start and end dates, production batch number or batch, etc.

3.10 recall parts

Electronic control units and software that implements recall activities through over-the-air update to eliminate defects.

3.11 vehicle user

A person who operates, drives, owns or manages a vehicle.

Examples: vehicle owner, an authorized representative or employee of a vehicle operator, an authorized representative or employee of a vehicle manufacturer.

[Source: GB 44496-2024, 3.11]

3.12 on-board software update system

Software and hardware installed on the vehicle end that are capable of directly receiving, distributing and verifying update packages from outside the vehicle to implement software update functions.

[Source: GB 44496-2024, 3.12]

3.13 additional effect of measures

The recall measures taken by the manufacturer affect some of the performance or functions of the vehicle, but do not cause new defects.

[Source: GB/T 39603-2020, 3.11, modified]

4 Abbreviations

The following abbreviations apply to this document.

HMI: Human Machine Interface

the-air update technology in accordance with the requirements of laws, regulations, departmental rules, policy documents and relevant standards.

6.2 Classification requirements

6.2.1 According to whether the problem solved by the manufacturer using over-the-air update technology is a defect (or emission hazard), the problem-solving activities are classified as follows:

- When the problem to be solved is a defect or emission hazard, it shall be carried out in accordance with the regulations of the recall activity based on over-the-air update;
- When the problem to be solved is a non-defect problem or a non-emission hazard problem, it shall be carried out in accordance with the regulations of the technical service activities based on over-the-air update technology.

6.2.2 When manufacturers use over-the-air update technology to add new functions or improve performance, they shall conduct risk assessment or emission hazard assessment on the updated automotive products. Activities are classified according to the assessment results:

- If it is determined that there are defects or emission hazards, it shall be reported to the recall authority in a timely manner and implemented in accordance with the regulations of the recall activity based on over-the-air update;
- If it is determined that there are no defects or emission hazards, the regulations for technical service activities based on over-the-air update technology shall be followed.

6.3 Security guarantee requirements

Manufacturers shall establish management systems and guarantee capabilities that are compatible with over-the-air update activities to ensure the safety of vehicles during and after the implementation of recall activity based on over-the-air update and technical service activities based on over-the-air update technology:

- The process of over-the-air update shall comply with the requirements of Chapter 4 and Chapter 5 of GB 44496-2024;
- It is not advisable to update while driving unless the update procedure requires it. In this case, make sure the vehicle is in a safe state during the update process;
- For the execution process of over-the-air updates that may affect the safe use of the vehicle, other technical measures shall be taken to ensure the safety of the vehicle during the update process;

- For vehicle over-the-air updates that may fail or have errors, ensure that the on-board software update system is restored to a previously available version or the vehicle is in a safe state in a timely manner.

7 Filing requirements

7.1 Filing for technical service activities based on over-the-air update technology

The time requirements for manufacturers to file technical service activities based on over-the-air update technology are as follows:

- The manufacturer shall complete the filing of technical service activities within 5 working days before the release and implementation of the over-the-air update activity;
- If the registered update information changes, it shall be updated within 20 working days.

7.1.2 Filing contents

When a manufacturer records a technical service activity based on over-the-air update, the content of the record includes basic vehicle information, basic update service information, update package information, cloud platform information and safety protection information.

7.2 Filing for recall activity based on over-the-air update

7.2.1 Filing time

The time requirements for manufacturers to file recall activity based on over-the-air update are as follows:

- The manufacturer shall complete the recall plan filing in accordance with the requirements of the recall authority within 5 working days after confirming the defect or emission hazard;
- The manufacturer shall complete the over-the-air update information filing within 5 working days before the recall is implemented. If the filed update information changes, it shall be updated within 20 working days.

7.2.2 Filing contents

7.2.2.1 Recall plan

The recall plan for recall activity based on over-the-air update filed by the manufacturer

functional changes;

- Software and hardware information of controllers related to the update component and their functional changes;
- Electronic and electrical architecture information such as network topology and in-vehicle network communication methods related to the system involved in the update component;
- Units, subsystems and vehicle functions and information security test reports of the update component and related systems.

7.2.2.2.5 System information of over-the-air update on vehicle end

The system information of the over-the-air update of the vehicle includes but is not limited to the following:

- Main node function information such as vehicle-side over-the-air update function information and safety solution information;
- Certification that the vehicle-side over-the-air update system complies with GB 44496-2024, provided by the manufacturer OR system safety evaluation report on vehicle-side over-the-air update provided by a third-party testing agency.

8 Requirements for the implementation of recall activities

8.1 Recall notice

8.1.1 Notice content

The content of the recall notice shall at least include the recall parts, description of the defect, possible consequences of the defect, update duration, vehicle condition conditions that must be met during the update, and disposal measures for update failure.

8.1.2 Notification method

8.1.2.1 The manufacturer may issue a recall notice in the following ways, including but not limited to:

- Registered mail;
- Vehicle-side methods such as vehicle-mounted HMI, vehicle-mounted IVI, instrumentation, HUD, etc.;
- Mobile phone text messages, mobile phone applications (Apps), etc.

8.1.2.2 The vehicle-side notification method shall be preferred. If the vehicle-side

notification method cannot be used due to vehicle hardware or software problems, the vehicle-side method can be used, but the notification shall be recordable and traceable.

8.1.2.3 If the vehicle user still has not updated after the manufacturer has confirmed and notified the vehicle user 5 times or more, a symbolic warning reminder can be issued on the vehicle end. The warning reminder is designed by the manufacturer and shall include obvious warning words.

8.2 Update log

8.2.1 Log transmission

The manufacturer shall upload the update log to the intelligent connected vehicle safety big data cloud platform in a timely manner.

8.2.2 Log content

The update log shall include but not be limited to the following:

- Cloud service platform system management log, including update completion status, update failure reason information and information security logs during the update process;
- Vehicle-cloud interaction log, including information, time, version number information before and after the update, update result, and update completion time information received by the vehicle-side over-the-air update request from the cloud;
- Execution log of the controller to be updated on the vehicle-side, including version information before and after the update of the controller to be updated, update execution time, update times, update results, update result judgment, and controller version information after the update;
- User HMI confirmation log, including user HMI confirmation information display time, display mode, user confirmation over-the-air update time, and user confirmation over-the-air update result information;
- In-vehicle over-the-air update communication log, including update scope confirmation, update package download time, over-the-air update vehicle status, and update start and end time information.

8.3 Supervision of over-the-air update process

8.3.1 Manufacturers

8.3.1.1 The manufacturer shall monitor the key information of the process of over-the-

9 Recall effect evaluation requirements

9.1 Evaluation method

The recall of automobile products based on over-the-air update technology shall be evaluated in accordance with GB/T 39603-2020. The overall completion of over-the-air update and offline update shall be comprehensively evaluated. If necessary, the effectiveness of the recall measures shall be verified.

9.2 Verification of the effectiveness of recall measures

After the recall of over-the-air update is implemented, if a large number of user complaints occur, the effectiveness of the measures shall be verified from the aspects of functional verification and information security verification. Among them, a large number of user complaints refers to when the number of valid complaints is greater than or equal to 50, or when the number of valid complaints is less than 50 but the ratio is greater than 5/1000.

Functional verification may be performed using one or more of the following combined methods that the manufacturer deems effective, including but not limited to:

- Boundary value method: based on test experience, focus on testing boundary data;
- Error guessing method: based on test experience, test more places where errors may occur;
- Equivalence method: divide the input conditions into several equivalence classes, and take a data in each equivalence class as the input condition for the test.

Information security verification may be performed using one or more of the following combined methods that the manufacturer deems effective, including but not limited to:

- Vulnerability scanning: confirm whether the test object has vulnerabilities;
- Penetration testing: verify that the test object can effectively implement corresponding security measures by simulating actual combat attacks on the system;
- Fuzz testing: stress test the functions of the test object through a large amount of data or signals. Determine whether the test object will have vulnerabilities or abnormal behavior under the set circumstances.

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