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General requirements of mobile laboratories

移动实验室通用要求

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Table of Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 General management requirements	5
5 General technical requirements	7
6 Requirements for mobile characteristics	9
7 Structural and design requirements	10
8 Manufacturing and inspection requirements (trial operation requirements)	12

General requirements of mobile laboratories

1 Scope

This standard specifies the management requirements, technical requirements, mobile characteristic requirements, structural and design requirements, and manufacturing and inspection requirements for various types of mobile laboratories.

This standard applies to the design, manufacturing, inspection, use, maintenance, and management of mobile laboratories.

2 Normative references

The following documents are essential for the application of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest versions (including all the amendments) are applicable to this document.

GB/T 27000 Conformity assessment - Vocabulary and general principles

VIM 3rd Edition International vocabulary of metrology - Basic and general concepts and associated terms

3 Terms and definitions

The terms and definitions defined in GB/T 27000, VIM 3rd, and the following apply to this document.

3.1 mobile laboratory

A laboratory that meets specific purposes and requirements, consists of complete sets of equipment, and conducts activities such as testing, calibration, or scientific experiments in movable facilities and environments.

3.2 mobile characteristic

Attributes of a mobile laboratory that affect activities such as testing, calibration, or scientific experiments at different extents due to movement.

3.3 mobile laboratory shelter

A cabin that is used to carry mobile laboratory experimenters, testing equipment,

respond to emergencies.

4.1.11 An occupational safety and health protection mechanism shall be established.

4.2 Management system

4.2.1 The mobile laboratory shall establish, implement, and maintain a documented management system suitable for its scope of activities to meet work quality requirements. Laboratory management shall ensure that these documents are communicated to relevant personnel, obtained, understood, and implemented by them.

4.2.2 The quality policy, goals, and overall objectives shall be established and reviewed during management reviews to ensure continuous improvement.

4.2.3 Procedures shall be established and maintained to control all internally developed or externally sourced documents that make up the management system.

4.2.4 Procedures for identifying, collecting, indexing, accessing, archiving, storing, maintaining, and cleaning quality and technical records shall be established and maintained.

4.3 Review of contract

Procedures for contract review shall be established and maintained to ensure that capabilities and resources are available and appropriate methods are used to meet customer requirements.

4.4 External services and supplies

Policies and procedures shall be in place to control external services and supplies to ensure continued compliance with mobile laboratory quality requirements.

4.5 Serving customers

On the premise of ensuring impartiality and other client confidentiality, the mobile laboratory shall actively cooperate with clients to meet client requirements and conduct adequate communication.

4.6 Complaints

Systems and procedures shall be in place to ensure that complaints from customers and other parties are handled promptly.

4.7 Control for non-conforming work

There shall be systems and procedures to deal with identified non-conforming work in a timely manner and take correction and/or corrective measures.

4.8 Corrective and preventive measures

4.8.1 Corrective action procedures shall be developed to eliminate the causes of nonconformity and prevent recurrence. Corrective actions shall be appropriate to the extent of the impact of the nonconformity encountered.

4.8.2 Preventive measure procedures shall be developed to eliminate potential causes of nonconformity and prevent their occurrence. Preventive measures shall be commensurate with the magnitude of the potential problem.

4.9 Internal audit

Internal audits shall be regularly organized or participated in according to predetermined schedules and procedures to verify that their operations continue to comply with the requirements of the management system.

4.10 Management review

Management system review procedures shall be established, and top managers shall regularly review the management system and activities to ensure their continued applicability and effectiveness, and make necessary changes or improvements.

4.11 Continuous improvement

4.11.1 The effectiveness of the management system shall be continuously improved through the use of quality policy, quality objectives, audit results, data analysis, corrective actions, preventive actions, and management reviews.

4.11.2 When planning and implementing changes to the management system, top management shall ensure its integrity.

5 General technical requirements

5.1 General

5.1.1 The characteristics of the mobile laboratory shall be fully considered to ensure the accuracy and reliability of the testing/calibration results.

5.1.2 The safety risks that are present at the work location where the mobile laboratory is located or will arrive shall be assessed to ensure that staff can fully cope with the environment they face.

5.2 Personnel

5.2.1 There shall be sufficient evidence to show that personnel engaged in mobile laboratory work have corresponding technical capabilities and occupational safety and

5.5.2 An inspection and maintenance plan for mobile laboratory equipment shall be developed, and the mobile laboratory shall be inspected and maintained in accordance with relevant standards or guidelines provided by the manufacturer to ensure its normal function and prevent contamination or performance degradation.

5.5.3 While inspecting and maintaining the equipment, the mobile carriers and support systems shall also be inspected and maintained accordingly to meet the requirements of the mobile laboratory's mobile characteristics.

5.5.4 All equipment that is used for testing and/or calibration and has a significant impact on the accuracy or validity of testing, calibration, and sampling results, including auxiliary measuring equipment (such as equipment used to measure environmental conditions) shall be calibrated before being put into use; attention shall be paid to periodic verification during use.

5.5.5 The functionality and calibration status of the equipment shall be verified before use.

5.5.6 When calibration results in a set of correction factors or corrected values, procedures shall be in place to ensure that they are backed up and updated correctly.

5.5.7 Inspection and maintenance shall be carried out by competent personnel, and the inspection and/or maintenance results shall be recorded in detail and saved.

6 Requirements for mobile characteristics

6.1 The mobile laboratory shall ensure that the results of testing, calibration, or scientific experiments during or after movement are valid.

6.2 The interference and/or influencing factors introduced by movement shall be identified during the design, analysis, manufacturing, testing, acceptance, daily use, management, and maintenance of each functional unit that makes up the mobile laboratory, and corresponding measures shall be taken to ensure interference and/or influencing factors are under control.

6.3 There shall be procedures to ensure that mobile laboratories do not cause safety hazards due to their mobile characteristics (including personnel safety, equipment and facility safety, environmental safety, etc.) and have emergency response capabilities in the event of a safety incident.

6.4 The mobile characteristic indicators of the mobile laboratory shall be identified, and parameter classification and severity classification shall be established; the grade combination shall consist of a series of characteristic conditions. Mobile laboratories used within the grade range shall ensure the accuracy and reliability of test data and meet usage requirements.

7 Structural and design requirements

7.1 General

7.1.1 If the supporting facilities of the mobile laboratory are not specified in this standard, the specifications shall be established and comply with the respective technical conditions.

7.1.2 Personnel capabilities and occupational security (including but not limited to safety, health, comfort, efficiency, etc.) shall be fully considered during the design, manufacturing, and use processes of mobile laboratories.

7.2 Design requirements

7.2.1 General requirements

The design of mobile laboratories shall give priority to standard parts and modular design to improve interchangeability and universality on the premise of meeting technical indicators.

7.2.2 Overall structure and layout design

The structure of the mobile laboratory shall be able to withstand the rated static load including its own weight and the rated dynamic load during lifting, long-distance transportation (a specified distance), and the test process. It shall have high overall strength, high stiffness, light weight, and effects such as fatigue-resistant, radiation-resistant, anti-interference, and anti-vibration; an environmental adjustment system shall be equipped as needed, and the work area shall be isolated from mobile carriers and ancillary equipment. The layout design shall fully consider safety passages, ergonomics, professional scientific experiment functions, number of staff, equipment layout, workflow, operating procedures, etc. as needed, and meet the laboratory design requirements related to ventilation, environmental protection, deserts, plateaus, cold regions, aerial work, water-surface operation, ergonomics, and machinery safety.

7.2.3 Design requirements for mobile laboratory shelter

7.2.3.1 The design of mobile laboratory shelters shall promptly consider the application of new materials, new technologies, and new processes to reduce costs and improve efficiency while ensuring the requirements of internal space and environmental conditions.

7.2.3.2 When designing the mobile laboratory shelter, emphasis shall be placed on the physiological and psychological effects of personnel working in the laboratory shelter for a long time.

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Contact: Wayne Zheng, Sales@ChineseStandard.net

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