



Space systems — Revision of ISO 14625
Ground support equipment for use at
launch, landing or retrieval sites —
General requirements

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1 Review

- ◆ Proposal of “Programme and Operation for Checkout of Launch Vehicle GSE at Launch Site” was first introduced in London, UK, Nov-2017.
- ◆ Comparison table with ISO 14625 as well as outlines of this NWIP were presented in Helsinki, Finland, Jun-2018. At the spring meeting WG3 participants concluded that preparing detailed changes to complement ISO 14625 seems to be a better way.
- ◆ Mr. Andre also noted that this NWIP needs to ensure there is no overlaps with ISO22772 (requirements of LV to EGSE interfaces) which is developed in WG2.



1 Review

- ◆ During WG3 Nov-2018 meeting, an update version was presented. There are no overlaps between ISO 22272 and this NWIP. There are differences in the scope, objectives, application and other aspects between ISO 14625 and this NWIP. The latter focused more on management and operation aspects for checkout and maintenance of GSE which had already been installed at integration and launch site.
- ◆ During WG3 Jun-2019 meeting WG3 experts proposed a revision of ISO 14625, integrating this NWIP by adding missing requirements in the main part, with associated detailed recommendations introduced in informative annex



1 Review

◆ During WG3 Nov-2019 meeting , The revised version of ISO14625 is provided, which includes: the scope of the standard, checkout and maintenance requirements for redundant systems or equipment; quality problems management for checkout and maintenance; Chapter 14 is added to introduce the detailed requirements for checkout and maintenance.



2 Recent Activity

- ◆ **The project team accepted WG3 experts' advices.**
- ◆ **Modify the ISO14625 with the revision mode.**
- ◆ **Specify checkout and maintenance items in table.**
- ◆ **All related materials have been uploaded to KAVI.**



3. Revised suggestion about ISO14625

◆ Scope

This International Standard specifies the general characteristics, performance, design, test, **operation, checkout, maintenance**, safety, reliability, maintainability and quality requirements for ground support equipment (GSE) and systems intended for use at launch, landing or retrieval-site installations, or other locations that are the responsibility of the launch, landing and retrieval site. This International Standard does not specify how to design, **operate, checkout and maintain** GSE, but establishes the minimum requirements to provide simple, robust, safe, reliable, maintainable and cost-effective GSE.



3. Revised suggestion about ISO14625

◆ Scope

This International Standard is applicable to the design, **regular checkout and routine maintenance** of non-flight hardware and software used to support the operations of transporting, receiving, handling, assembly, inspection, test, checkout, service, launch and recovery of space vehicles and payloads at the launch, landing or retrieval sites. As such, the requirements of this International Standard are optional for hardware used only at the manufacturing, development or test sites prior to arrival at the launch, landing or retrieval sites. However, if such GSE is temporarily used at a launch, landing or retrieval site, for whatever reason, conformity with all the safety-related requirements of this International Standard is a minimum requirement for the GSE.



3. Revised suggestion about ISO14625

◆ 6.2.6 Redundancy

Redundant systems, subsystems, units or components shall be physically separated or otherwise protected to ensure that failure of one will not prevent the other from performing the function. **Separate functional test of redundant systems, subsystems, units or components should be considered according to user's specific requirements in GSE checkout and maintenance stage.**



3. Revised suggestion about ISO14625

◆ 11 Quality assurance

➤ 11.5 Checkout and maintenance

The GSE which have been installed at integration and launch site should be dealt with regular checkout and routine maintenance before launch mission. The regular checkout and routine maintenance are helpful to ensure that the functional and characteristic performance of GSE are in good condition. Some potential problems, defects, accidents, risks and hazards of GSE shall be eliminated. In the launch procedure, test and launch control process shall not be halted by failure of GSE which provides guarantee for the success of launch mission.



3. Revised suggestion about ISO14625

◆ 11 Quality assurance

➤ 11.5 Checkout and maintenance

At least the following tasks shall be fulfilled during GSE checkout and maintenance:

- a) Correctness of technical conditions, functional performance and characteristic parameter
- b) Compatibility of interfaces among GSE, LV, upper stage ,spacecraft, and astronaut
- c) Normality of seperate redundant systems, subsystems, units or components in accordance with specific conditions



3. Revised suggestion about ISO14625

◆ 11 Quality assurance

➤ 11.6 Quality problems management

The quality problems of GSE including failures, defects, accidents, and other undesirable conditions shall be resolved according to the requirements of ISO18238:2015.



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.1 General requirements

14.1.1 GSE checkout and maintenance shall be carried out in accordance with the OMD

14.1.2 The checkout and maintenance of GSE includes regular checkout and launch mission checkout.

14.1.3 GSE is stored in the environment with high humidity or salt fog, the number of checkout and maintenance shall be increased.

14.1.4 The human and material resource requirements, safety requirements and guarantee conditions of GSE checkout and maintenance shall be determined.

14.1.5 The test data and monitoring results of GSE checkout and maintenance shall be recorded.

3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.1 General requirements

14.1.6 GSE shall be attached with qualification certificates, technical specifications, operation and maintenance manuals, and GSE shall be used within the validity period of calibration.

14.1.7 Checkout and maintenance personnel shall wear anti-static shoes and anti-static clothes when working, and release static electricity in advance. Checkout and maintenance personnel shall wear safety helmet, antiskid shoes and safety belt when working at heights.

14.1.8 After the completion of GSE checkout and maintenance, the checkout and maintenance items, test results, problems and measures shall be summarized.



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.2 Checkout and maintenance items

GSE	Checkout and maintenance items
Servicing GSE	<p>Check and maintain the facilities for storage and transfer the launch vehicle.</p> <p>Check and maintain the power supply and grounding .</p> <p>Check and maintain the conventional propellant filling pipeline.</p> <p>Check and maintain the low temperature propellant filling pipeline.</p> <p>Check and maintain the tank car and storage tank.</p> <p>Check and maintain the pressurizing equipment.</p> <p>Check and maintain the air conditioning system.</p> <p>Check and maintain the video monitoring system.</p> <p>Check and maintain the sewage treatment system</p> <p>Calibrate the instruments and sensors of temperature, pressure and flow.</p>



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.2 Checkout and maintenance items

GSE	Checkout and maintenance items
Checkout and test GSE	Check and maintain the computers, switches and servers. Check and maintain the optical fiber communication equipment. Check and maintain the launch control equipment for LV. Check and maintain the test equipment for LV. Check and maintain the cables and electrical connectors. Check and maintain the spare parts. Conduct regular system level tests on GSE.



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.2 Checkout and maintenance items

GSE	Checkout and maintenance items
Handling and transportation GSE	<ul style="list-style-type: none">Check and maintain the sling.Check and maintain the lifting device.Check and maintain the support stand and jacks.Check and maintain the transport vehicles, dollies and trailers.Check and maintain the shipping containers.Check and maintain the strongbacks and special handling mechanisms.



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.2 Checkout and maintenance items

GSE	Checkout and maintenance items
Auxiliary GSE	<ul style="list-style-type: none">Check and maintain the launch pad.Check and maintain the access stands, platforms and working ladder.Check and maintain the launching tower.Check and maintain the swing function of the swing bar.Check and maintain the hydraulic systems of tower, launching platform and swing bar.Check and maintain the alignment or calibration hardware.



3. Revised suggestion about ISO14625

◆ 14 Checkout and maintenance requirements

14.2 Checkout and maintenance items

GSE	Checkout and maintenance items
Umbilical GSE	<ul style="list-style-type: none">Check and maintain the electrical connector.Check and maintain the gas and liquid connector.Check and maintain the connector of hydrogen and oxygen adding and discharging.Check and maintain the hydrogen and oxygen exhaust connector.Check and maintain the air pipe connector.Check and maintain the conventional propellant connector.Check and maintain the conventional propellant overflow connector.



6. Working Plan

◆ Meeting

- discuss the ISO 14625 revision suggestions with experts
- call for comments
- improve revision

◆ In a few months

- modify and improve revision by communicating with experts
- improve revision

Thank you very much !