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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Prevention and control requirements for foreign object debris in launch vehicles

运载器多余物预防和控制要求

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4.1 General Rules

4.1.1 The goal of foreign object prevention and control for launch vehicles is to ensure the normal operation of the development, launch, and flight processes, and to prevent incidents caused by foreign objects. Quality issues must be addressed to ensure the functionality, performance, and reliability of the launch vehicle and to prevent unwanted hazards to the spacecraft.

4.1.2 The prevention and control of extraneous materials on carriers should be based on prevention and the principle of full participation, and should be implemented in a whole-process and all-element control manner.

4.1.3 Both the vehicle development and user units should develop targeted procedures for the prevention and control of unwanted materials, in conjunction with their quality management systems. The preface clarifies the responsibilities and control procedures of relevant departments and personnel, and provides the necessary resources for the prevention and control of excess materials.

4.1.4 The vehicle development and user units should, in conjunction with product characteristics and manufacturing processes, systematically identify products sensitive to particulate matter or pollutants. Identify the types, sources, and generation processes of foreign matter sensitive to products. Based on the identification results, propose foreign matter prevention and control requirements and formulate relevant regulations. And take reasonable and effective measures to prevent and control excess matter. For parts of the product or manufacturing processes sensitive to particulate matter or contaminants, appropriate measures should be implemented. Targeted key controls.

4.1.5 Effective prevention and control measures should be taken during the product manufacturing process, excess materials should be cleaned up in a timely manner, potential hazards should be eliminated, and appropriate inspections should be carried out. Measures should be taken to ensure that the prevention and removal of excess materials meet relevant requirements. The methods used for removing and inspecting excess materials should not lead to the generation of other problems. Remaining items.

4.1.6 When quality problems occur due to foreign matter, zeroing should be carried out in accordance with GB/T 29076, effective corrective measures should be taken, and lessons should be learned. Three in reverse.

4.1.7 Records of the prevention and control of foreign matter on the launch vehicle should be maintained. Areas requiring high cleanliness and difficult to inspect subsequently should be photographed. Or video recording.

4.1.8 The coverage, effectiveness, and implementation status of excess material prevention and control measures should be considered in design reviews, process reviews, and production preparations. One of the contents of inspection and product acceptance review.

4.1.9 Cleanliness or foreign matter control requirements should be specified in the technical agreements for purchased parts, outsourced parts, and accessories.

4.2 Environmental Control

4.2.1 The factory layout and zoning should be reasonable, and the assembly workshop (or area) should be physically separated from the parts processing workshop (or area). isolation.

4.2.2 Production should be carried out in a facility that meets the requirements for the prevention and control of foreign matter. The facility should be conducive to the prevention

and control of foreign matter and be reasonably designed. Install facilities such as air showers to prevent potential external objects from entering.

4.2.3 Measures should be taken to control the environment of the production site and storage area to meet the requirements for cleanliness, temperature, humidity, light intensity, pH, and salt spray. The production and storage environment requirements for these products. The manufacturing process for products with special cleanliness requirements should be conducted in a qualified cleanroom. The cleanroom design shall be carried out in accordance with GB 50073.

4.2.4 The production site should be managed by zone and fixed location, with appropriate signage. Items unrelated to production should not be placed there, and restrictions on such items should be imposed. Personnel entering or engaging in activities unrelated to production.

4.2.5 Containers for collecting excess materials should be set up at the production site and cleaned up in a timely manner.

4.2.6 Production areas and work surfaces should be cleaned before and after work to maintain cleanliness and order. Cleaning operations should not move excess materials to other areas. This could lead to excess material entering the product.

4.2.7 Before commencing work, it should be checked whether the production, assembly, and testing environments meet the product requirements.

4.2.8 Regular inspections and maintenance of factory buildings and other facilities are recommended, with timely repairs. Maintenance, upkeep, and repair work on factory buildings and facilities should not result in unnecessary material waste. Hidden dangers.

4.3 Personnel Control

4.3.1 All personnel involved in product research and development and production should receive training on foreign matter prevention and control and pass the assessment. The training recipients include... This includes, but is not limited to, the design, process, production, testing, procurement, and storage of products and their equipment, as well as related management personnel, and those who may come into contact with them. Product personnel.

4.3.2 Personnel entering the production test site shall wear the prescribed attire.

4.3.3 Based on the risk identification results, restrictions should be placed on bringing items unrelated to work into the work area.

4.3.4 Any extraneous items or potential hazards discovered should be reported promptly.

4.3.5 External personnel (such as customers, visitors, suppliers, infrastructure maintenance personnel, etc.) should receive necessary training and briefings on the prevention and

control of unwanted materials. They may be informed, or accompanied, guided, and supervised by trained personnel.

4.4 Tool Control

4.4.1 An effective tool management system should be established to ensure clear responsibilities and traceable process records.

4.4.2 The materials and structure of tools should not easily generate or conceal excess material.

4.4.3 Small tools used on site should be equipped with dedicated tool containers, and small-sized tools should be packaged in sets or individually.

4.4.4 Tools should be managed according to their location and condition. Tools should be checked and counted before and after work; their structure should be intact, components complete, and quantities accurate. Consistent.

4.4.5 The use of tools should not create any hidden dangers or risks of generating foreign matter. When working above or inside the product, measures should be taken to avoid this. Tools become superfluous when incorporated into a product.

4.4.6 If a tool is found to be missing or a component is missing that could potentially enter the product, it should be reported immediately, and efforts should be made to locate or remove it from the product. The possibility of [something].

4.4.7 Necessary tools for cleaning and inspecting excess materials should be provided.

Note. The term "tools" in this document refers to production tools in a broad sense, including general tools, measuring tools, instruments, equipment, fixtures, and molds, but excluding factory facilities.

4.5 Material Control

4.5.1 Materials and their heat treatment, surface treatment, and other processing methods should be selected appropriately. Materials that are dense, stable, wear-resistant, have low shedding, and low particle size are preferable. Materials with low particle and fiber content should not be selected, as they are prone to static electricity, have strong adsorption or adhesion properties, and be suitable for use in certain environments and operating conditions. It should not easily produce excess material.

4.5.2 The material shall be compatible with the medium it comes into contact with and shall not react with the medium physically, chemically or electrochemically.

4.5.3 The quality parameters of the gases and liquids used should be controlled according to the characteristics of the product, such as the purity or cleanliness of the gas (solid particles) and dew point. (Moisture content), oil content, pH of the liquid, purity or