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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 45075-2024

**General specification for echelon use of decommissioning
photovoltaic modules**

退役光伏组件梯次利用通用规范

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1 Scope

This document specifies the general requirements for the echelon use of decommissioning photovoltaic modules, together with the requirements for collection, the echelon use application scenarios, the echelon use products, the nameplate, the packaging and the management.

This document applies to the echelon use of decommissioning crystalline silicon photovoltaic modules; other kinds of photovoltaic module may be dealt with by reference to it.

3 Terms and definitions

The terms and definitions given in GB/T 2297, together with the following, apply to this document.

3.1 decommissioning photovoltaic module. A photovoltaic module that is no longer used, arising when the design service life of a photovoltaic power station expires, or during use because the warranty has expired, the system has been upgraded, the land has been exchanged, a natural disaster has occurred, policy has changed or for similar reasons.

3.2 echelon use. The process in which a decommissioning photovoltaic module, directly or after processing, repair or other related work, keeps all or part of its function and is used again.

4 General requirements

Traceability management shall be set up for decommissioning photovoltaic modules put to

echelon use: information on their source, manufacture, sale and use shall be collected, recorded and filed, and the file shall be kept for not less than 5 years.

The enterprise producing the echelon use product shall bear the responsibility for after-sales service, take-back and other related duties for that product.

Products that fail during the echelon use of decommissioning photovoltaic modules, and echelon use products that have reached the end of their life, shall be handed to a recycling and treatment enterprise holding the relevant qualification; they shall not be discarded at will or sent directly to landfill.

5 Collection

Decommissioning photovoltaic modules should not be exposed to sunlight during transport and storage.

Before transport and while being handled, decommissioning photovoltaic modules shall be packed so that they do not come loose, take up moisture, deform or suffer damage during normal transport and storage.

The packing environment for decommissioning photovoltaic modules shall be clean, dry and free from harmful media.

Decommissioning photovoltaic modules shall be sorted sensibly for delivery and transport, and appropriate protective measures such as shock absorption and bracing shall be taken during transport.

The condition of the load and the integrity of the packages shall be inspected and accepted, and the information recorded.

6 Requirements for echelon use

6.1 General requirements. The application scenarios of echelon use products shall be divided by function into those whose core function is generating electricity and other application scenarios. The application scenario of an echelon use product shall not be more demanding than the original application scenario in terms of the system voltage class and the climatic environment. Decommissioning photovoltaic modules shall be tested and classified so that the products fit for echelon use are identified; the flow chart is given in Figure 1. For echelon use products whose core function is generating electricity, a safety assessment specification matched to the particular application scenario shall be drawn up according to the climatic environment and the system voltage class of the different generating scenarios. Echelon use products whose core function is generating electricity shall meet the requirements of 6.2.1 to 6.2.5; echelon use products in other application scenarios that have to be used live shall meet the requirements of 6.2.1, 6.2.2 and 6.2.5.

6.2.1 Appearance. The outer surface of the echelon use product shall be sound and

complete. There shall be no continuous bubbles or delamination inside the product, and the total area of all bubbles and delamination shall be less than 1 percent of the total area of the module; this covers the interfaces between the encapsulant - ethylene vinyl acetate film (EVA), polyvinyl butyral film (PVB), polyolefin elastomer film (POE), co-extruded film (EPE) and the like - and the front or back glass, between the encapsulant and a film backsheet, between the encapsulant and the cells, and between the encapsulant and the electrode isolation strips, as well as delamination within a film backsheet itself. If an appearance defect can be repaired, the module shall be examined for appearance again after repair; if it cannot be repaired, the module shall be scrapped.

6.2.2 Electrical safety performance. The echelon use product shall undergo an insulation test and a wet leakage current test, and the results shall meet the requirements of MQT 03 and MQT 15 of IEC 61215-2:2021.

6.2.3 Electrical performance. The echelon use product shall undergo maximum power determination and an electroluminescence (EL) test; the electrical parameters measured, such as the maximum power, the short-circuit current and the open-circuit voltage, and the EL defects identified shall meet the requirements agreed between supplier and purchaser. Where a diode fault is identified through the electrical performance test and can be repaired, the module shall undergo the electrical performance test again after repair.

6.2.4 Other safety performance. The safety assessment of an echelon use product whose core function is generating electricity shall include but is not limited to the bypass diode test, the reverse current overload test and the environmental stress test. Such a product shall also meet the other safety performance requirements agreed between supplier and purchaser. An echelon use product that does not meet the other safety performance requirements shall be downgraded to echelon use in another application scenario.

6.2.5 Other performance. The other performance of an echelon use product shall comply with the relevant standards of the industry in which the product is used and with the other performance requirements agreed between supplier and purchaser for the particular application scenario. A product that does not comply shall be downgraded to echelon use in another application scenario, or scrapped.

6.3 Test methods. Appearance inspection: examine every module at an illuminance of not less than 1 000 lx. Insulation test: carry out the insulation test in accordance with MQT 03 of IEC 61215-2:2021. Wet leakage current test: carry out the wet leakage current test in accordance with MQT 15 of IEC 61215-2:2021; this test may be done on a sampling basis. Maximum power determination test: carry out the maximum power determination test in accordance with MQT 01 of IEC 61215-2:2021. Electroluminescence (EL) test: carry out the electroluminescence test in accordance with IEC TS 60904-13:2018. Other safety performance tests: test by the safety test methods agreed between supplier and purchaser other than those listed above. Other performance tests: test by the other performance test methods agreed between supplier and purchaser for the particular application scenario.

7 Nameplate and packaging

7.1 Nameplate. The echelon use product shall carry, in a position on its outer surface where it can easily be read, the words or a symbol meaning echelon use product, together with a statement of the application scenario of the product. The marking and nameplate of the echelon use product shall be clear and easy to identify, strong and durable, and not easily altered or replaced. The nameplate of the echelon use product shall not cover the nameplate of the original manufacturer. The nameplate shall contain at least the following: a) information on the producer of the echelon use product, that is its name and contact details; b) the date of manufacture, the model and specification, the performance parameters and the test information of the echelon use product; c) the main material composition of the echelon use product; d) the degradation rate and the warranty period of the echelon use product.

7.2 Packaging. Products for different echelon use scenarios shall be packed separately by category and the echelon use scenario shall be marked. The words echelon use product shall appear in a conspicuous position on the packaging. The packaging shall carry conspicuous wording and symbols such as this way up, do not roll and fragile, the symbols complying with GB/T 191. The various marks on the outside of the packaging shall be applied neatly and firmly and in a consistent position.

8 Management

The enterprise producing echelon use products shall hold the relevant qualification and shall have sound bodies and corresponding management systems for operation, finance, risk control, quality management, credit management, statistics, safety, technical service and the purchase and sale management of echelon use products.

The enterprise shall have business and working premises suited to the scale of its echelon use business and to its operating needs, shall be equipped with the necessary facilities, equipment and auxiliary tools, and shall comply with the national and industry standards that safeguard production safety and metrological verification.

The enterprise shall be able to carry out echelon use performance testing and shall be able to assure the production consistency and the safety and reliability of its echelon use products.

The enterprise shall draw up procedures for dealing with emergencies, shall have complete protective equipment and measures, and its operations shall comply with the relevant national laws, regulations and standards on occupational safety and health.

The enterprise shall have the corresponding environmental protection facilities, including plant for the treatment of waste water, waste gas, noise and solid waste and for its storage, and the discharge and treatment of pollutants shall meet the relevant national pollutant