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GB/T 42315-2023

Code of maintenance for electrochemical energy storage station

电化学储能电站检修规程

Issued on: March 17, 2023 **Implemented on: October 1, 2023**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

This document was issued on 17 March 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 42315-2023 covers the maintenance of an electrochemical energy storage station - the items to be worked, the methods used and the quality each job has to reach across the battery arrays, the power conversion system, the monitoring and control system, and the auxiliary facilities. Before any of it begins, the general requirements call for a maintenance schedule, a maintenance plan and an emergency plan, so that work on a live installation is planned rather than improvised. The battery array clauses carry the bulk of the document and open with the isolation sequence: the primary AC and DC circuit breakers and the isolating switch opened, and a grounding wire fitted, before anyone reaches into a rack. The power conversion clauses do the same on their side, opening the AC and DC side switches and then measuring the residual voltage at the ports rather than assuming it has decayed. That distinction is why the document exists. A battery stores its energy chemically and cannot be switched off, so a string sits at full voltage with every breaker open, and a converter holds charge after disconnection; maintenance written for a substation does not transfer to a storage hall. Written for station operators, maintenance contractors and the engineers who draft site work instructions and permits.

This document specifies the items, methods and quality requirements for battery arrays,

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power conversion systems, monitoring and control systems and auxiliary facilities of the electrochemical energy storage station.

This document is applicable to electrochemical energy storage stations - with a power of 500 kW and an energy of 500 kW.h and above - that use lithium ion batteries, lead-carbon batteries, flow batteries, and fuel cells as energy storage carriers. It also applies as a reference to other electrochemical energy storage stations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 1094.6, Power transformers - Part 6: Reactors

GB/T 1094.11, Power transformers - Part 11: Dry-type transformers

GB 4962, Technical safety regulation for gaseous hydrogen use

GB/T 12706 (all parts), Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1.2 kV) up to 35 kV (Um = 40.5 kV)

GB/T 17702, Capacitors for power electronics

GB/T 20840.2, Instrument transformers - Part 2: Additional requirements for current transformers

GB/T 20840.3, Instrument transformers - Part 3: Additional requirements for inductive voltage transformers

GB/T 24499, Technology glossary for gaseous hydrogen, hydrogen energy and hydrogen energy system

GB 32311, Minimum allowable values of energy efficiency and energy efficiency grades for hydrogen producing systems by water electrolysis

3 Terms and definitions

Terms and definitions determined by DL/T 2528 and GB/T 24499 are applicable to this document.

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4 General requirements

4.1 Before the maintenance of the electrochemical energy storage station, a maintenance schedule shall be formulated; also, a maintenance plan and an emergency plan shall be compiled.

4.2 The maintenance of the electrochemical energy storage station includes scheduled maintenance and troubleshooting; also, a condition-based maintenance should be carried out according to the operation of the equipment. The cycle of scheduled maintenance - which should be 1 year - can be adjusted according to the assessment results. The condition-based maintenance should be determined according to the comprehensive assessment results of equipment operating status, fault location, fault type and severity based on operating data.

4.3 The maintenance operation shall be carried out in the aspects of appearance inspection, inspection test, repair, post-repair test, etc. in combining with equipment status. An overall performance test of the energy storage system shall be carried out after the replacement of main components such as battery arrays, power conversion systems, and monitoring and control systems.

4.4 The maintenance of primary equipment such as voltage transformers, switches, surge arresters, and transformers shall be carried out in accordance with the provisions of DL/T 573, DL/T 727, DL/T 1686, DL/T 1689, DL/T 1700, and DL/T 1702; the maintenance of secondary equipment such as AC-DC system for station, relay protection and automation, and metering shall be carried out in accordance with the regulations of DL/T 724, DL/T 995, and DL/T 1664.

4.5 Maintenance personnel shall be trained regularly to be familiar with the design requirements, running conditions and equipment technical requirements of the power station, and to master the maintenance skills and quality requirements of the power station equipment.

4.6 Maintenance tools and appliances shall be inspected and calibrated regularly, and used within the inspection and calibration date.

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4.7 Maintenance personnel shall prepare spare parts in advance according to the maintenance schedule and order cycle time.

4.8 The maintenance safety of the electrochemical energy storage station shall meet the requirements of GB/T 42288.

4.9 The electrochemical energy storage station shall formulate environmental protection measures during the maintenance process. Waste batteries and electrolytes shall be recycled.

4.10 After the maintenance is completed, a maintenance assessment of the energy storage station shall be carried out, and a maintenance report shall be compiled.

5 Maintenance of battery arrays

5.1 General provisions

5.1.1 Before the maintenance of battery arrays, the primary circuit AC/DC circuit breaker and isolating switch shall be disconnected, a grounding wire shall be installed on the AC side of the power conversion system, and a safety warning sign shall be hung.

5.1.2 During battery maintenance, the positive and negative poles of battery cells, battery modules, battery clusters, and stacks shall not be short-circuited or reversed.

5.1.3 After the maintenance of lithium ion batteries, lead-carbon batteries, flow batteries and fuel cell arrays, the total voltage balance among battery clusters of the same battery array should be adjusted. The total voltage range between lithium ion battery and lead-carbon battery clusters shall not be greater than 2% of the average value; the total voltage range between flow battery clusters shall not be greater than 4% of the average value; the total voltage range between fuel cell clusters shall not be greater than 5% of the rated value.

5.2 Maintenance of lithium ion battery arrays

5.2.1 Appearance inspection

5.2.1.1 Check the appearance of the battery module, including deformation, cracking, leakage, corrosion and tightness of electrical connections.

5.2.1.2 Check the deformation, damage, corrosion of the battery bracket and the

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