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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 43462-2023

Technical guide for black-start of electrochemical energy storage

电化学储能黑启动技术导则

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Foreword

This document was issued on 28 December 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 July 2024.

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 43462-2023 covers the use of an electrochemical storage station as the seed of a system restoration after a blackout. The overall requirements separate the two duties such a station can take on, distinguished by its grid connection point, the object it starts and the path it follows: starting generating plant, or restoring the supply to a transformer substation. Technical conditions come next, setting out what the station, its converters and its stored energy have to satisfy before it can be counted on for the duty at all, and then the sequence itself: black-start preparation, the self-starting of the storage station, the starting of the generation equipment it is to energise, including a set fed through the station service transformer, and the restoration of a substation's black-start supply. Informative annexes give typical black-start modes and the contents a black-start scheme should carry. A grid with no voltage cannot be restarted by plant that needs a supply to start, and the conventional answer, a diesel or hydro unit, is not available everywhere; a storage station already on site can do the work, but only if its readiness has been defined in advance

instead of discovered on the night. For dispatch centres, storage station operators and the engineers who write restoration plans.

This document specifies the overall requirements and technical conditions for the black-start of

electrochemical energy storage, as well as the technical requirements for the black-start, such

as: black-start preparation, self-starting, starting power generation equipment and restoring

transformer substation black-start power supply, etc.

This document applies to the planning, design, test and operation of electrochemical energy

storage systems or power stations with black-start capability and that can serve as black-start

power sources.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 36558 General Technical Requirements for Electrochemical Energy Storage System of

Power System

GB/T 38334 Technical Specification for Black-start of Hydropower Station

GB/T 50064 Code for Design of Overvoltage Protection and Insulation Coordination for AC

Electrical Installations

GB 51048 Design Code for Electrochemical Energy Storage Station

DL/T 2528 Basic Terminology of Electrical Energy Storage

3 Terms and Definitions

The terms and definitions defined in DL/T 2528 and the following are applicable to this document.

3.1 black-start of electrochemical energy storage

After a large-scale power outage in the power system, in the absence of external power support, the process, in which, the electrochemical energy storage system or power station with black-start capability in the system is used to start the connected power generation equipment or restore power supply to the transformer substation equipment.

3.2 black-start time

The time from when the power generation equipment or transformer substation loses the working power supply for station service and backup power supply to when the power generation equipment or transformer substation is capable of restoring power supply to the grid connection point.

4 Overall Requirements

4.1 In accordance with the grid connection point, start object and path of the electrochemical energy storage system or power station, the electrochemical energy storage black-start can be divided into two types: starting the power generation equipment and restoring the transformer substation black-start power supply. The typical black-start mode is shown in Appendix A.

4.2 The planning and layout of the black-start electrochemical energy storage system or power station shall be coordinated with the black-start power supply layout and path planning for its access to the power grid.

4.3 The design of electrochemical energy storage stations shall meet the requirements of GB 51048 and GB/T 36558. During the black-start process, the power configuration required for

the black-start of the electrochemical energy storage station shall satisfy the sum of demands

for normal load and impact load, and the energy configuration shall meet the sum of electricity

demands in each stage.

4.4 The black-start time of an electrochemical energy storage station should not be greater than

2 hours.

4.5 When an electrochemical energy storage station is used as a black-start power source, the

discharge energy required for the black-start shall be reserved during normal operation.

4.6 Electrochemical energy storage stations that have passed the black-start test and are capable

of providing black-start services shall sign a black-start agreement with the grid dispatching

institution.

4.7 The grid dispatching institution shall calculate the black-start range and recovery path of

the electrochemical energy storage station and formulate a power grid black-start plan.

4.8 A black-start scheme shall be formulated for a black-start energy storage station. The

content of the scheme is shown in Appendix B. In addition, black-start capability tests shall be

regularly conducted. Equipment related to black-start shall be re-tested after overhaul or

technical transformation.

4.9 Black-start energy storage stations shall organize black-start emergency plan drills every

year to familiarize themselves with various operations, shorten the black-start time, and revise

less than the continuous electricity consumption of 15 minutes for station service.

5.1.5 The energy storage converter control system of the energy storage unit used for self-

starting and the battery management system should have the capability of self-drawing power

on the DC side.