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

GB/T 44389-2024

Ice plug isolation of piping in nuclear power plant

核电厂管道冰塞冷冻隔离

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is modified to adopt ISO 23467:2020 "Ice plugs and freezing isolation of nuclear power plant pipelines".

This document has the following structural adjustments compared to ISO 23467:2020.

--- The paragraphs in 4.4.2 are adjusted to columns;

---4.4.3.3 corresponds to 4.4.3.4 in ISO 23467:2020, and 4.4.3.4 corresponds to 4.4.3.5 in ISO 23467:2020.

---5.3 corresponds to 5.4 in ISO 23467:2020, and 5.4 corresponds to 5.5 in ISO 23467:2020.

The technical differences between this document and ISO 23467:2020 and their reasons are as follows.

--- Deleted the requirements for pipeline linings and coatings and the description of pressure tests in the scope (see ISO 23467:2020, Part 1 Chapter), the internal lining coating does not affect the construction of the ice plug, and the pressure test is irrelevant to the content of the document and no special explanation is given;

--- Deleted the requirements for personnel deployment during ice jam construction (see 4.1), the previous and subsequent contents were repeated, and the training and authorization model More in line with the actual situation of domestic construction teams;

--- Added instructions for confirming the on-site heat source before ice plug construction (see 4.3.4) to ensure that there is no heat source that may appear during the ice plug construction.

The impact of;

--- Added the items prohibiting ice plugging construction for pipeline structures and fittings [see 4.3.7c) and 4.3.7d)], and added ISO 23467:2020 the requirements in "1 Scope" are included to avoid stress and defects that increase the risk of ice jam construction, which is in line with my country's actual operation conditions;

--- Added the requirement that if the preconditions for ice plug construction are not met and ice plug construction is still required, the process verification test should be carried out, and the test the basic content of the project (see 4.3.8) is to solve the problem of having to carry out ice jam construction under extreme conditions;

--- Deleted the pipe diameter requirements when Freon is used as a refrigerant (see 4.4.2). For safety and environmental protection reasons, Freon is no longer used as a refrigerant.

For refrigerant;

--- Deleted the requirement that when two welds or pipe fittings are both maintenance points, one of them should be kept away from ice plugs (see 4.4.3.1).

The distance between the fittings and welds and the ice plug construction location shall be 20 times the outer diameter of the pipeline or 600 mm (the larger of the two).

--- Deleted the requirement for test demonstration when the distance between the ice plug position and the weld does not meet the requirements of this document (see ISO 23467:2020 4.4.3.3 in this document), this part of the requirements has been specified in 4.4.3.1 of this document;

--- Changed the requirements for the construction plan (see 5.2), considering the compliance of nuclear-grade pipeline ice plugging construction, and adding the approval of the nuclear safety regulatory authorities content and remove duplicate content;

--- Deleted the tool management requirements (see 5.3 in ISO 23467:2020), and ice plug tool management is not included in the technical content of the document illustrate;

--- Deleted the normative references related to non-destructive testing before ice plugging construction, and clarified the acceptance criteria (see 5.4).

Damage detection can be used for inspection;

--- Deleted the requirement that no RT or UT is required after ice jam construction (see 7.3). RT or UT may be required in special cases.

UT detection.

The following editorial changes were made to this document.

--- Corrected the printing error of ISO 23467:2020 (see 4.4.4);

---DN400 (16 inches), DN300 (12 inches), DN100 (4 inches) are changed to nominal diameter 400mm, nominal diameter 300mm, the diameter is 100 mm, standard unit (see

4.4.2);

--- The reference standard for non-destructive testing reports has been deleted (see the note to Chapter 8 of ISO 23467:2020). No changes have been made to the format of non-destructive testing reports.

Require;

--- Deleted the chapter indication in the process flow chart (see Appendix C). Not all process links have corresponding chapters.

To, delete uniformly;

---Removed references.

1 Scope

This document specifies the pre-construction preparation, ice plug construction, ice plug quality assurance, and ice plug record and report of nuclear power plant ice plug freezing isolation.

Require.

This document applies to ice plug freezing isolation technology using liquid nitrogen or dry ice as refrigerant (cryogenic medium) on metal pipes in nuclear power plants.

NOTE: The freezing medium is usually water or a water mixture (e.g. a boric acid mixture).

2 Normative references

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document.

Iceplug

The refrigerant is used to partially freeze the refrigerant medium in the pipeline to solidify it, thereby forming a solid section in the pipeline that can withstand the pressure.

Swimming pressure ice cubes.

Note: Refrigerant is used to partially freeze the liquid in the pipeline to solidify it and form an ice plug, which is convenient for the maintenance of downstream pipelines, valves and other equipment.

Iceplugjacket

A device that contains refrigerant wrapped around the outer surface of the pipe.

Note: It is used to cool the refrigerant inside the pipeline, so that it solidifies to form an ice plug and maintains the required isolation time. The selection of jacket length is related to the diameter of the pipeline.

For selection of jacket length, see Appendix A.

iceplugarea

The range covered by the ice plug jacket.

Refrigerant

Refrigerant used to create ice plugs inside pipes.

Freezing medium

The medium freezes inside the pipe to form an ice plug.

Ultrasonic testing; UT Use ultrasound to perform non-destructive testing of solid materials for cavities, non-bonding and strength variations.

Radiographic testing; RT A nondestructive testing method that uses the ability of short-wavelength electromagnetic radiation (high-energy photons) to penetrate various materials to detect hidden defects in materials.