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Protection rules for industrial X-ray radiographic equipment up to 500kV

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Foreword

Chapters 1 and 2 of this Standard are recommended clauses, while others are mandatory clauses.

This Standard is not equivalent to German industrial standards DIN 54113.1:1992 *Non-destructive testing - Radiation protection rules for the technical application of X-ray equipment up to 500kV - General technical safety requirements* and DIN 54113.2:1992 *Non-destructive testing - Radiation protection rules for the technical application of X-ray equipment up to 500kV - General technical safety requirements and testing for the manufacture, installation and operation*.

This Standard was formulated on the basis of JB 7788-1995.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of Liaoning Instrument Research Institute (now known as "Liaoning Instrument Research Institute Co., Ltd").

Responsible drafting organization of this Standard: Liaoning Instrument Research Institute (now known as "Liaoning Instrument Research Institute Co., Ltd").

Participating drafting organizations of this Standard: Dandong Radiative Instrument Co., Ltd, Dandong Wanquan NDT Equipment Factory, Dandong Health Inspection Institute, Shanghai Advanced NDT Equipment Co., Ltd and Dandong NDT Equipment Co., Ltd.

Main drafters of this Standard: Yu Zhijun, Li Yibin, Zhang Hong, Jian Jieli, Chen Ninglong and Bao Ruling.

Protection rules for industrial X-ray radiographic equipment up to 500kV

1 Scope

This Standard specifies the protective property requirements of industrial X-ray radiographic equipment up to 500kV (hereinafter referred to as “X-ray equipment”, including the X-ray equipment with general structure, X-ray equipment with fine structure, X-ray equipment for special protection, X-ray equipment for full protection, etc.), the structural protection requirements of X-ray equipment, and the requirements for X-ray protection during use, service regulations and monitoring.

This Standard is applicable to the design, manufacture, installation and operation of the X-ray equipment up to 500kV.

2 Normative references

The provisions in the following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, parties who reach an agreement based on this Standard are encouraged to study if the latest editions of these documents are applicable. For undated references, the latest editions apply to this Standard.

GB/T 17150-1997 *Radiological protection monitoring procedure - Part 1: Industrial X-ray detection*

GB 18871-2002 *Basic standards for protection against ionizing radiation and for the safety of radiation sources*

3 Requirements

3.1 Limits for the leakage-ray air kerma rate of the X-ray equipment (hereinafter referred to as “leakage-ray kerma rate”)

3.1.1 X-ray equipment with general structure

X-ray equipment with general structure includes the instruments with general structure of the stationary X-ray equipment, mobile X-ray equipment and

areas belong to the workplaces. The symbols shall be clear and distinct, along with the words “no entry into the X-ray region” in orange.

4.3.2 Monitoring areas in mobile workplaces

The monitoring areas in mobile workplaces refer to the areas outside the control areas, along with the leakage-ray air kerma rates of greater than 25 $\mu\text{Gy/h}$.

5 Service regulations

5.1 Protection director and protection agent

The application registrant of the X-ray instrument is the person responsible for the radiation protection. This person in charge shall delegate necessary number of properly trained radiation protection agents in written form, shall stipulate their terms of reference within the enterprise, and shall report to the regulatory authorities for filing.

5.2 Guidance

The staff members using the X-ray equipment shall master necessary radiation protection expertise. The person responsible for the radiation protection shall pay attention to regular training and guidance for these personnel, both before and after their first induction. The training contents and time shall be noted down as well.

5.3 Dose detection

USE the dosimeter specified by the regulatory authority and conforming to the national standard to conduct dose monitoring to the staff members (for instance, USE the dosimeter for general purpose). Furthermore, the personnel responsible for radiation protection and the radiation protection agents shall be able to independently use the measuring instruments and to conduct dose monitoring at any time as required by the regulatory authority.

5.4 Installation

Before the installation of X-ray instruments, MAKE evaluation and field verification for the protective properties of the radiation protection facilities that shall be equipped with in structure, based on the expected operating condition.

The channels in the control areas shall meet the following conditions:

- It is able to observe the startup status of the X-ray equipment via the device.

5.6.3 Data that shall be provided by the organizations using the X-ray equipment

- a) inspection report and certificate issued by the expert (or experts);
- b) equipment using organization's certificate of authorization or a copy of the certificate;
- c) plan of the radiation protection area and operating mode as the basis;
- d) X-ray equipment operating instructions, including the radiation protection measures, allowable operation methods and operating parameters. COMBINE the X-ray equipment with other non-destructive flaw detectors and accessories if necessary.
- e) radiation protection marking.

5.7 Conditions of using the X-ray equipment in batches

When meeting all of the following conditions, it is allowed to use the X-ray equipment that has been reported to the local regulatory authority but still awaiting approval:

- a) X-ray equipment's structure has been approved.
- b) X-ray equipment has already been inspected by an expert confirmed by the regulatory authority.
- c) Each X-ray protection agent shall be possessed of professional radiation protection training certificate. Such expertise of the agents shall be obtained by participating in a radiation protection course approved by the regulatory authority and obtained by professional examination.
- d) Other professionals shall master necessary expertise with regard to radiation protection, which shall comply with the requirements of Sections 5.2 and 5.6.2.
- e) REPORT to local regulatory authority before using the X-ray instruments in accordance with specified time limit. The report shall be attached with a copy of allowable structural type certificate, including component inspection certificate, expert inspection report, expertise investigation report, power of attorney and the X-ray protection agents' professional training certificates on radiation protection.

5.8 Conditions of using the X-ray equipment with special protection without approval

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