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

GB/Z 41476.4-2022

**Non-destructive testing instruments - Radiation protection
rules for the technical application of X-ray equipment up to 1
MV - Part 4: Calculation of control area**

无损检测仪器 1MV以下X射线设备的辐射防护规则 第4部分：控制区域的计算

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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 of Standardization Documents" drafted. This document is part 4 of GB /Z 41476 "Rules for Radiation Protection of X-ray Equipment Below 1MV for Nondestructive Testing Instruments". GB /Z 41476 has published the following parts.

- 1. General safety technical requirements;
- 2. Technical requirements for protection;
- 3. Calculation formulas and charts for radiation protection of X-ray equipment below 450kV;
- 4. Calculation of the control area. Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents. This document is proposed by China Machinery Industry Federation. This document is under the jurisdiction of the National Standardization Technical Committee of Testing Machines (SAC/TC122). This document is drafted by: China Testing and Certification Group Co., Ltd., Edson (Xiamen) Electronics Co., Ltd., Liaoning Instrument Research Institute Co., Ltd., Institute of Applied Electronics, Chinese Academy of Engineering Physics, General Electric Detection and Control Technology (Shanghai) Co., Ltd., Shanghai Yinghua Testing Technology Co., Ltd., Dandong Nondestructive Testing Equipment Co., Ltd., Shanghai Chaoqun Nondestructive Testing Equipment Co., Ltd. The main drafters of this document. Wan Feng, Lin Junming, Yu Zhijun, Chen Hao, Kong Fanqin, Li Bo, Dong Diangang, Fu Yan.

X-rays are electromagnetic waves with extremely short wavelengths and high energy, and their wavelengths are shorter than those of visible light. As five routine detection methods One, X-ray detection has been widely used in industrial non-destructive testing. Because of its strong penetration, it will cause certain damage to the body of the inspector. The safety protection problem in this X-ray inspection has received extensive attention. GB /Z 41476 aims to establish protection requirements for X-ray equipment below 1MV And personnel safety protection rules, it is proposed to be composed of 4 parts.

1. General safety technical requirements. The purpose is to give the dose limit for personnel in the operation of X-ray equipment below 1MV, Equipment usage requirements, etc.
2. Technical requirements for protection. The purpose is to provide effective, Reliable radiation protection measures.
3. Calculation formulas and charts for radiation protection of X-ray equipment below 450kV. The purpose is to give below 450kV The calculation formulas and related charts of the main technical indicators of X-ray equipment protection are convenient for the calculation of relevant data in the process of X-ray protection.
4. Calculation of the control area. The purpose is to provide a calculation method for the control area of X-ray equipment below 1MV, and for the third Some content is further supplemented. Nondestructive testing instruments Radiation protection rules for X-ray equipment up to 1MV Part

1 Scope

GB/Z 41476.4-2022 is the Chinese national standard on non-destructive testing instruments - radiation protection rules for the technical application of x-ray equipment up to 1 mv - part 4: calculation of control area, in the field of testing. The /Z suffix marks it as a guiding technical document: it does not prescribe requirements that can be certified against, but sets out the technique, the method or the state of the art that the standards bodies recommend following. It was issued on 15 April 2022 by the State Administration for Market Regulation; Standardization Administration of China. As a guiding technical document it carries no separate date of entry into force: it applies from publication. Classification: ICS 19.100, CCS N78. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes a method for quickly calculating the size of the control area in the use of mobile X-ray nondestructive testing equipment. This document is suitable for the rapid calculation of the control area when the radiation protection professional personnel use the mobile X-ray nondestructive testing equipment on-site.

2 Normative references

There are no normative references in this document.

3 Terms and Definitions

There are no terms and definitions that need to be defined in this document.

4 Calculation method of control area

The size and shape of the control area depends on the following.

- Tube voltage;
- Tube current;
- X-ray direction;
- X-ray tube position;
- protecting mask;
- Mobile control area radiation limit. According to the absorption of radiation by the detection object and the shield, the actual control area is shown in Figure 1.