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

**GB/T 22452-2025**

Replacing GB/T 22452-2008

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**General specification for borate non-linear optical crystal  
devices**

硼酸盐非线性光学单晶元件通用规范

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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 replaces GB/T 22452-2008 "General Technical Requirements for Borate Nonlinear Optical Single Crystal Components" and GB/T 22452- Compared with.2008, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- Changed the terms and definitions (see Chapter 3, Chapter 3 of the.2008 edition);
- Deleted product classification (see Chapter 4 of the.2008 edition);
- Added test conditions (see Chapter 4);
- Changed the technical requirements (see Chapter 5, Chapter 5 of the.2008 edition);
- Added SHG operating wavelength, specific wavelength SHG critical phase matching angle, specific wavelength absorptivity, film firmness, film layer High humidity resistance, temperature shock resistance of the film layer, friction resistance of the film layer, surface roughness, edge collapse, cracking, chamfering, etc. The content of the indicator (see Chapter 5);
- Increased film firmness, film resistance to high humidity, film resistance to temperature shock, and film resistance to friction (see Section 6 chapter);
- Added inspection categories and inspection items (see Chapter 7). Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee on Optical Radiation Safety and Laser

Equipment Standardization (SAC/TC284). This document was drafted by: Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Mindu Innovation Laboratory, Fujian Fujing Technology Co., Ltd., The Institute of Aerospace Information Innovation of the Chinese Academy of Sciences, the 26th Institute of China Electronics Technology Group Corporation, and the Jiangxi Provincial Inspection, Testing and Certification Institute Industry Product Inspection and Testing Institute, Beijing Leishengqiang Technology Co., Ltd., Chengdu Dongjun Laser Co., Ltd., China Electronics Technology Group The 11th Research Institute of the Company, the 209th Research Institute of China Ordnance Industry, Han's Laser Technology Industry Group Co., Ltd., China Metrology University. The main drafters of this document are. Wang Shuaihua, Zheng Yi, Huang Xin, Zheng Fakun, Wu Shaofan, Ma Yunfeng, Zhang Xing, Chen Wei, Ding Yuchong, He Tongbin, Zhang Ge, Zhu Jianhui, Zhou Shibin, Sun Yutong, Guo Li, Jia Kai, Qin Laishun, Li Bingxuan, Chen Min, Luo Xingmu, Chai Xiandan. The previous versions of this document and the documents it replaces are as follows:

---First published in 2008 as GB/T 22452-2008;

---This is the first revision. General specification for borate nonlinear optical single crystal components

## 1 Scope

China's national general specification for optical devices made from borate non-linear crystals. It defines the terminology for beta-barium borate and lithium triborate single crystal components, specifies the technical requirements, the inspection rules and the packaging, marking, transport and storage, and describes the corresponding test methods. A non-linear optical crystal is what changes the colour of a laser. A laser produces one wavelength determined by its gain medium, and a great many applications need a different one - ultraviolet for micromachining, lithography and spectroscopy, green for display and pumping, tunable output for research. The crystal converts them: driven hard enough, its response to the optical field is no longer proportional, and it generates the second, third or fourth harmonic of the light passing through it, or mixes two beams into their sum or difference. Beta-barium borate and lithium triborate are the two workhorses of that job in the ultraviolet, because they combine a large non-linear coefficient with transparency far into the ultraviolet and a high resistance to optical damage. The device is a cut, oriented and polished piece of crystal, and its performance depends on properties a chemical specification cannot capture: the orientation of the cut relative to the crystal axes, which sets the phase matching and is specified in minutes of arc; the surface figure, parallelism and polish; the coating and its damage threshold; the absorption and scattering in the bulk; and the presence of inclusions and stress. These crystals are also hygroscopic to differing degrees, so the packaging and storage requirements are functional rather than administrative. Issued on 25 April 2025 and in force since 1 August 2025, it replaces GB/T