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

GB/T 29054-2019

Replacing GB/T 29054-2012

Cast multicrystalline silicon bricks for photovoltaic solar cells

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 29054-2012 "Solar Grade Cast Polycrystalline Silicon Block". This standard is compared with GB/T 29054-2012, except The main technical changes besides editorial changes are as follows:

---Modified the scope of application, and changed "suitable for polycrystalline silicon blocks using casting technology to prepare polycrystalline silicon wafers" to "suitable for casting technology Quasi-square polycrystalline silicon blocks (including monocrystalline silicon blocks) obtained by cutting on the prepared silicon ingots. The product is used for further cutting into silicon wafers Making solar cells" (see Chapter 1, Chapter 1 of the.2012 edition).

--- Deleted GB/T 6616, SEMIPV1-0709 in the normative reference documents, and added GB/T 1554, GB/T 2828.1- 2012, GB/T 31854, moved GB/T 1551, GB/T 1553, GB/T 1557, GB/T 1558 to references (see Chapter 2, Chapter 2 of the.2012 edition).

---The definition of silicon block has been deleted, and the definition of effective height, single crystal-like and maximum grain area ratio has been added (see Chapter 3,.2012 Chapter 3 of the edition).

--- Deleted the classification (see Chapter 4 of the.2012 edition).

---The end face size is changed from 125mmx125mm, 156mmx156mm to 156.75mmx156.75mm, other sizes, The recommended increase or decrease is an integer multiple of 1mm (see 4.1.1, see Chapter 4 of the.2012 edition).

---Modified the end face size and allowable deviation (see 4.1.1, Chapter 4, 5.1.6 of the.2012 edition).

---Modified the carrier lifetime requirements, from $\geq 1\mu\text{s}$ to not less than $2\mu\text{s}$ (see 4.2.3, 5.2 in the.2012 edition).

---Modified the requirement of interstitial oxygen content, from $\leq 8 \times 10^{17}$ atoms/cm³ to not more than 6×10^{17} atoms/cm³ (see 4.3,

5.2 of the 2012 edition).

---The maximum grain area ratio and defect density requirements, test methods, inspection rules, etc. of monocrystalline silicon blocks have been added (see 4.7, 4.8, 5.13, 5.14, Chapter 6).

--- The requirement for boron concentration has been deleted (see

1 Scope

China's national standard for the cast multicrystalline silicon bricks used to make photovoltaic solar cells. It specifies the requirements, the test methods, the inspection rules and the marking, packaging, transport and storage of the quasi-square silicon bricks cut from cast ingots, which are subsequently sliced into wafers for cell manufacture. The brick is the intermediate product in the middle of the photovoltaic chain. Polysilicon feedstock is melted and cast into a large ingot in a crucible; the ingot is cut into bricks of the cross-section a wafer will have; the bricks are sliced into wafers; and the wafers become cells. The brick is therefore where the material's quality is fixed and where it is bought and sold between companies - and the properties that decide how efficient the finished cell will be are all established at this stage: the resistivity and its uniformity, the minority carrier lifetime, the oxygen and carbon content, the dislocation density and the grain structure. A wafer maker buying bricks is buying those properties, and none of them can be corrected downstream. The 2019 revision tracks where the industry went. The scope is rewritten to cover the quasi-square bricks cut from cast ingots including the quasi-monocrystalline material, which the 2012 edition did not contemplate; definitions are added for the effective height, for quasi-monocrystalline and for the maximum grain area ratio; the classification chapter is deleted; and the end face dimensions are changed from the 125 mm and 156 mm squares of the 2012 edition to 156.75 mm square with other sizes recommended. That dimensional change is the whole history of the industry in one line: the wafer got bigger, repeatedly, and the standard follows. Issued on 4 June 2019 and in force since 1 May 2020, it replaces GB/T 29054-2012.

This standard specifies the requirements, test methods, inspection rules, markings, packaging of cast polycrystalline silicon blocks for solar cells (hereinafter referred to as silicon blocks) Contents of installation, transportation, storage, quality certificate and purchase order (or contract). This standard applies to quasi-square polycrystalline silicon blocks (including monocrystalline silicon blocks) cut from silicon ingots prepared by casting technology.

Note. Polycrystalline silicon blocks are cut into silicon wafers and used to make solar cells.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article. For undated references, the latest version (including all amendments) applies to this document.

GB/T 1550 Test method for conductivity type of extrinsic semiconductor materials

GB/T 1554 Silicon crystal integrity chemical preferred corrosion inspection method

GB/T 2828.1-2012 Sampling inspection procedure by attributes Part

3 Terms and definitions

The following terms and definitions defined in GB/T 14264 apply to this document.

3.1 Effective height The silicon block meets the cutting height of various technical requirements.

3.2 Quasi-monocrystalline silicon Through the single crystal seed crystal, the cast polycrystal formed by the directional solidification method is grown. The crystal has large grains obviously in the same direction as the seed crystal. It is called cast single crystal, quasi single crystal, etc.

3.3 The percentage of the largest grain area the percentage of the largest single grain The ratio of the area of the largest crystal grain area with the specified crystal orientation on the cross-section of the single-crystal silicon block to the total cross-sectional area of the single-crystal silicon block.

4.1 Dimensions

4.1.1 The end face of the silicon block is quasi-square, the end face size is 156.75mmx156.75mm, and the allowable size deviation is ± 0.25 mm. Need it Other size, size increase or decrease should be an integer multiple of 1mm.

4.1.2 The effective height of the silicon block should not be less than 100mm.