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

**GB/T 33144-2016**

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**Superabrasives - Test method for impact toughness index**

超硬磨料 冲击韧性测定方法

**Issued on: October 13, 2016**

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Standardization Administration of the PRC**

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### Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by the China Machinery Industry Federation. This standard is owned by the National Standard Committee on Abrasive Tools (SAC/TC139). The drafting unit of this standard. Zhongnan Diamond Co., Ltd., China Ordnance Industry Standardization Research Institute, Zhengzhou Abrasive Grinding and Research Institute Limited Company, Henan Yellow River Whirlwind Co., Ltd., Zhengzhou Huajing Diamond Co., Ltd., Beijing Institute of Technology, Fu Nike Superhard Materials Co., Ltd. Limited company. The main drafters of this standard. Zhang Fengling, Lu Canhua, Mai Lvbo, Bao Hua, Wang Yuchang, Shao Jingru, Tong Yi, Wu Jianzhong, Wang Zhitao, Zhang Kui. Determination of Impact Toughness of Superhard Abrasives

### 1 Scope

China's national standard method for determining the impact toughness and thermal shock toughness of superabrasives, incorporating Amendment 1 of 2019. It specifies the terms and definitions, the apparatus and equipment, the test conditions, the sample preparation and the determination procedure, and it applies to synthetic diamond of grit size 20/25 to 325/400 and cubic boron nitride of grit size 30/40 to 325/400. Superabrasives are diamond and cubic boron nitride, the two hardest materials available in quantity, and they are used as the cutting grit in grinding wheels, saw blades and drilling tools. Hardness is what lets a grit cut, but it is not what determines how a wheel performs. What matters as much is toughness: whether a grain, struck repeatedly as the wheel turns, holds together, fractures to expose a fresh edge, or shatters and falls out. A grit that is too tough dulls and glazes, because it will not break to renew its cutting edges and simply rubs; a grit that is too weak disintegrates and is lost from the bond before it has done any work. Between those extremes lies the property that this method measures, and it is why two diamond powders of identical size and purity can behave completely differently in the same wheel. The determination is mechanical and direct: a weighed sample is sealed in a capsule with a steel ball and shaken at a set frequency for a set number of impacts, then sieved, and the proportion of grains that survive unbroken is the toughness index. The thermal shock variant heats the sample first, which is what reveals how a grit will behave after the brazing

or sintering used to make the tool. Issued on 13 October 2016 and in force since 1 May 2017.

This standard specifies the terms and definitions of impact toughness and thermal shock toughness of superhard abrasives, apparatus and equipment, test conditions, sample preparation Preparation and determination procedures. This standard applies to the size of 20/25 ~ 325/400 of synthetic diamond and the particle size of 30/40 ~ 325/400 cubic boron nitride impact Determination of toughness.

## 2 Normative reference documents

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

GB/T 308.1 Rolling bearing balls - Part 1. Steel balls

GB/T 6406 superhard abrasive particle size test

JB/T 3914 superhard abrasive sampling method

## 3 Terms and definitions

The following terms and definitions apply to this document.

**3.1 Impact frequency** The number of impacts per unit time of the impact toughness tester is expressed by the number of revolutions per unit time of the drive wheel.

Note. The unit of impact frequency is r/min.

**3.2 Impact times impactcounts** The number of times the specimen is subjected to the impact is expressed as the total number of revolutions of the drive wheel rotation of the impact toughness tester.

**3.3 Not broken rate unbrokenratio** The sample according to a certain impact frequency, subject to a certain number of shocks, and according to the provisions of the conditions after screening, the quality of the sieve and the sample quality The ratio is expressed as a percentage.

**3.4 Impact toughness TI** The impact resistance of the specimen. The value is expressed by multiplying the arithmetic mean of the unbroken rate of the sample by 100.

**3.5 Thermal impact toughness thermalimpacttoughnessindex TTI** After the conditions of high temperature treatment and cooling to room temperature, the impact resistance of the sample crushing performance. The value of the sample is not broken with the arithmetic The average is multiplied by 100.