



**SLOVENSKI STANDARD**  
**SIST EN ISO 20501:2023**

**01-marec-2023**

**Nadomešča:**  
**SIST EN 843-5:2007**

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**Fina keramika (sodobna keramika, sodobna tehnična keramika) - Weibullova statistika za podatke o trdnosti (ISO 20501:2019)**

Fine ceramics (advanced ceramics, advanced technical ceramics) - Weibull statistics for strength data (ISO 20501:2019)

Hochleistungskeramik - Weibullstatistik von Festigkeitswerten (ISO 20501:2019)

Céramiques techniques - Analyse statistique de Weibull des données de résistance à la rupture (ISO 20501:2019)

**Ta slovenski standard je istoveten z: EN ISO 20501:2022**

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## Fine ceramics (advanced ceramics, advanced technical ceramics) - Weibull statistics for strength data (ISO 20501:2019)

Céramiques techniques - Analyse statistique de Weibull des données de résistance à la rupture (ISO 20501:2019)

Hochleistungskeramik - Weibullstatistik von Festigkeitswerten (ISO 20501:2019)

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## European foreword

The text of ISO 20501:2019 has been prepared by Technical Committee ISO/TC 206 "Fine ceramics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 20501:2022 by Technical Committee CEN/TC 184 "Advanced technical ceramics" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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The text of ISO 20501:2019 has been approved by CEN as EN ISO 20501:2022 without any modification.



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**Fine ceramics (advanced ceramics,  
advanced technical ceramics) —  
Weibull statistics for strength data**

*Céramiques techniques — Analyse statistique de Weibull des données  
de résistance à la rupture*

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## ISO 20501:2019(E)

### Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 206, *Fine ceramics*.

This second edition cancels and replaces the first edition (ISO 20501:2003), which has been technically revised. It also incorporates the Technical Corrigendum ISO 20501:2003/Cor.1:2009.

The main changes compared to the previous edition are as follows:

- the terms and definitions in [Clause 3](#) have been updated and modified;
- a method to treat a higher number of specimens ( $N > 120$ ) has been introduced for method A: maximum likelihood parameter estimators for single flaw populations;
- in [Annex D](#), example codes have been added for calculating the maximum likelihood parameters of the Weibull distribution with modern analysis software.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Measurements of the strength at failure are taken for one of two reasons: either for a comparison of the relative quality of two materials regarding fracture strength, or the prediction of the probability of failure for a structure of interest. This document permits estimates of the distribution parameters which are needed for either. In addition, this document encourages the integration of mechanical property data and fractographic analysis.

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# Fine ceramics (advanced ceramics, advanced technical ceramics) — Weibull statistics for strength data

## 1 Scope

This document covers the reporting of uniaxial strength data and the estimation of probability distribution parameters for advanced ceramics which fail in a brittle fashion. The failure strength of advanced ceramics is treated as a continuous random variable. Typically, a number of test specimens with well-defined geometry are brought to failure under well-defined isothermal loading conditions. The load at which each specimen fails is recorded. The resulting failure stresses are used to obtain parameter estimates associated with the underlying population distribution.

This document is restricted to the assumption that the distribution underlying the failure strengths is the two-parameter Weibull distribution with size scaling. Furthermore, this document is restricted to test specimens (tensile, flexural, pressurized ring, etc.) that are primarily subjected to uniaxial stress states. [Subclauses 6.4](#) and [6.5](#) outline methods of correcting for bias errors in the estimated Weibull parameters, and to calculate confidence bounds on those estimates from data sets where all failures originate from a single flaw population (i.e. a single failure mode). In samples where failures originate from multiple independent flaw populations (e.g. competing failure modes), the methods outlined in [6.4](#) and [6.5](#) for bias correction and confidence bounds are not applicable.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

NOTE See also Reference [1].

### 3.1 Defect populations

#### 3.1.1 flaw

inhomogeneity, discontinuity or (defect) feature in a material, which acts as stress concentrator due to a mechanical load and has therefore a certain risk of mechanical failure

Note 1 to entry: The flaw becomes critical if it acts as fracture origin in a failed specimen.