First edition
2021-12

Corrected version
2022-06

Geometrical product specifications (GPS) — Surface texture: Profile —

Part 2: Terms, definitions and surface texture parameters

Spécification géométrique des produits (GPS) — État de surface: Méthode du profil —

Partie 2: Termes, définitions et paramètres d'état de surface

Reference number
ISO 21920-2:2021(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**
3.1 General terms 1
3.2 Geometrical parameter terms 10
3.3 Geometrical feature terms 14

4 Field parameters **22**
4.1 General 22
4.2 Height parameters 22
4.2.1 General 22
4.2.2 Arithmetic mean height 22
4.2.3 Root mean square height 22
4.2.4 Skewness 22
4.2.5 Kurtosis 22
4.2.6 Total height 23
4.2.7 Maximum height per section 23
4.3 Spatial parameters 24
4.3.1 General 24
4.3.2 Autocorrelation length 24
4.3.3 Dominant spatial wavelength 24
4.4 Hybrid parameters 25
4.4.1 General 25
4.4.2 Root mean square gradient 25
4.4.3 Arithmetic mean of absolute gradient 25
4.4.4 Maximum absolute gradient 25
4.4.5 Developed length 25
4.4.6 Developed length ratio 26
4.5 Material ratio functions and related parameters 26
4.5.1 Material ratio functions 26
4.5.2 Material ratio parameters 31
4.5.3 Parameters for stratified surfaces using the material ratio curve 33
4.5.4 Parameters for stratified surfaces using the material probability curve 35
4.5.5 Volume parameters 36

5 Feature parameters **38**
5.1 Parameters based on peak heights and pit depths 38
5.1.1 General 38
5.1.2 Maximum peak height 39
5.1.3 Mean peak height 39
5.1.4 Maximum pit depth 39
5.1.5 Mean pit depth 40
5.1.6 Maximum height 40
5.2 Parameters based on profile elements 40
5.2.1 General 40
5.2.2 Mean profile element spacing 42
5.2.3 Maximum profile element spacing 42
5.2.4 Standard deviation of profile element spacings 42
5.2.5 Mean profile element height 42
5.2.6 Maximum profile element height 42
5.2.7 Standard deviation of profile element heights 42
5.2.8 Peak count parameter 43

5.3 Parameters based on feature characterization 43
5.3.1 General 43
5.3.2 Named feature parameters 43
Annex A (informative) **Determination of the first and second derivative** **45**
Annex B (informative) **Determination of the local curvature** **48**
Annex C (normative) **Determination of the material ratio curve** **49**
Annex D (normative) **Determination of profile parameters for stratified surfaces** **50**
Annex E (normative) **Crossing-the-line segmentation to determine profile elements** **59**
Annex F (normative) **Feature characterization** **65**
Annex G (informative) **Summary of profile surface texture parameters and functions** **69**
Annex H (informative) **Specification analysis workflow** **72**
Annex I (informative) **Changes to previous ISO profile documents** **74**
Annex J (informative) **Overview of profile and areal standards in the GPS matrix model** **75**
Annex K (informative) **Relation to the GPS matrix model** **76**
Bibliography **77**

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).

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).

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.

This document was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 290, *Dimensional and geometrical product specification and verification*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 21920-2 cancels and replaces ISO 4287:1997, ISO 13565-2:1996 and ISO 13565-3:1998, which have been technically revised.

It also incorporates the Amendment ISO 4287:1997/Amd 1:2009 and the Technical Corrigenda ISO 4287:1997/Cor 1:1998, ISO 4287:1997/Cor 2:2005 and ISO 13565-2:1996/Cor 1:1998.

The main changes are related to ISO 4287 and are as follows:

— all field parameters are now related to the evaluation length;

— unambiguous evaluation of profile elements;

— definition of new parameters, in particular parameters based on the watershed transformation.

A list of all parts in the ISO 21920 series can be found on the ISO website.

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.

This corrected version of ISO 21920-2:2021 incorporates the following corrections:

— ISO 12085:1996 and ISO 12085:1996/Cor 1:1998 have been removed from the list of documents which this document replaces as they have been reinstated.

Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences chain link B of the chains of standards on profile surface texture.

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system of which this document is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this document and the default decision rules given in ISO 14253-1 apply to the specifications made in accordance with this document, unless otherwise indicated.

For more detailed information of the relation of this document to other standards and the GPS matrix model, see Annex K.

This document develops the terminology, concepts and parameters for profile surface texture.

Throughout this document, parameters are written as abbreviated terms with lower-case suffixes (as in Rq) when used in a sentence, and are written as symbols with subscripts (as in R_q) when used in formulae, to avoid misinterpretations of compound letters as an indication of multiplication between quantities in formulae. The parameters with lower-case suffixes are used in product documentation, drawings and data sheets.