



**International  
Standard**

**ISO 16610-22**

**Geometrical product specifications  
(GPS) — Filtration —**

**Part 22:  
Linear profile filters: Spline filters**

*Spécification géométrique des produits (GPS) — Filtrage —  
Partie 22: Filtres de profil linéaires: Filtres splines*

**Second edition  
2026-03**

This document is a preview generated by EMS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Characteristics of the spline filter for open profiles</b> .....	<b>3</b>
4.1 General.....	3
4.2 Filter equations.....	3
4.2.1 Determination of the large-scale lateral component.....	3
4.2.2 Determination of the small-scale lateral component.....	4
4.3 Transmission characteristics.....	5
4.3.1 Transmission characteristic for the large-scale lateral component.....	5
4.3.2 Transmission characteristic for the small-scale lateral component.....	6
<b>5 Characteristics of the spline filter for a closed profile</b> .....	<b>7</b>
5.1 General.....	7
5.2 Filter equations.....	7
5.2.1 Determination of the large-scale lateral component.....	7
5.2.2 Determination of the small-scale lateral component.....	8
5.3 Transmission characteristics.....	8
5.3.1 Transmission characteristic for the large-scale lateral component.....	8
5.3.2 Transmission characteristic of the small-scale lateral component.....	9
<b>6 Series of nesting index values</b> .....	<b>10</b>
<b>7 Tension parameter <math>\beta</math></b> .....	<b>10</b>
<b>8 Implementation</b> .....	<b>10</b>
<b>9 Filter designation</b> .....	<b>11</b>
<b>Annex A (informative) Examples for the application of the spline filter</b> .....	<b>12</b>
<b>Annex B (informative) Influence of the tension parameter <math>\beta</math></b> .....	<b>15</b>
<b>Annex C (informative) Relationship to the filtration matrix model</b> .....	<b>21</b>
<b>Annex D (informative) Relationship to the GPS matrix model</b> .....	<b>22</b>
<b>Bibliography</b> .....	<b>23</b>

## 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 document 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)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of patents which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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 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 second edition cancels and replaces the first edition (ISO 16610-22:2015), which has been technically revised.

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

- correction of the transmission characteristics, [Formulae \(8\)](#) and [\(9\)](#) in the first edition, and correction of the example Figure C.4 in the first edition;
- addition of an informative [Annex B](#) to show the influence of the tension parameter  $\beta$  ;
- addition of the transmission characteristics for closed profiles that apply to the case of roundness filtration.

A list of all parts in the ISO 16610 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](http://www.iso.org/members.html).

## 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 links C and E in the GPS matrix structure.

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 information on the relationship of this document to the filtration matrix model, see [Annex C](#).

For more detailed information on the relation of this document to other standards and the GPS matrix model, see [Annex D](#).

This document develops the terminology and concepts of linear spline filters for surface profiles. Linear spline filters for surface profiles have a transmission of 50 % for sinusoidal surface profiles with wavelengths equal to the cut-off wavelength. They separate the large- and small-scale lateral components of surface profiles in such a way that the surface profiles can be reconstructed without altering. Depending on the selected nesting index and tension parameter, linear spline filters offer one method for F-operation.



# Geometrical product specifications (GPS) — Filtration —

## Part 22: Linear profile filters: Spline filters

### 1 Scope

This document specifies linear spline filters for the filtration of surface profiles. It defines, in particular, how to separate large- and small-scale lateral components of surface profiles.

The concepts presented for closed profiles are applicable to the case of roundness filtration. Where appropriate, these concepts can be extended to generalized closed profiles, especially for surface profiles with re-entrant features.

Examples for the application of the spline filter are given in [Annex A](#). The influence of the tension parameter  $\beta$  on the large-scale lateral component of the profile is shown in [Annex B](#).

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16610-1:2015, *Geometrical product specifications (GPS) — Filtration — Part 1: Overview and basic concepts*

ISO 16610-20:2015, *Geometrical product specifications (GPS) — Filtration — Part 20: Linear profile filters: Basic concepts*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16610-1, ISO 16610-20, ISO/IEC Guide 99 and the following apply.

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

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

#### 3.1

##### surface profile

line resulting from the intersection between a surface portion and an ideal plane

Note 1 to entry: The orientation of the ideal plane is usually perpendicular to the tangent plane of the surface portion.

Note 2 to entry: See ISO 17450-1:2011, 3.3 and 3.3.1, for the definition of an ideal plane.

[SOURCE: ISO 16610-1:2015, 3.1.2, modified — Note 2 to entry replaced.]