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Standards

Irish Standard  
I.S. EN ISO 16610-41:2015

# Geometrical product specifications (GPS) - Filtration - Part 41: Morphological profile filters: Disk and horizontal line-segment filters (ISO 16610-41:2015)

## I.S. EN ISO 16610-41:2015

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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EUROPEAN STANDARD

**EN ISO 16610-41**

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**Geometrical product specifications (GPS) - Filtration - Part 41:  
Morphological profile filters: Disk and horizontal line-segment  
filters (ISO 16610-41:2015)**

Spécification géométrique des produits (GPS) - Filtrage -  
Partie 41: Filtres de profil morphologiques: Filtre disque et  
filtre segment de droite horizontal (ISO 16610-41:2015)

Geometrische Produktspezifikation (GPS) - Filterung - Teil  
41: Morphologische Profilfilter: Filter mit Kreisscheibe und  
horizontaler Strecke (ISO 16610-41:2015)

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**EN ISO 16610-41:2015 (E)**

<b>Contents</b>	<b>Page</b>
European foreword .....	<b>3</b>

## **European foreword**

This document (EN ISO 16610-41:2015) has been prepared by Technical Committee ISO/TC 213 “Dimensional and geometrical product specifications and verification” in collaboration with Technical Committee CEN/TC 290 “Dimensional and geometrical product specification and verification” the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by December 2015, and conflicting national standards shall be withdrawn at the latest by December 2015.

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

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### **Endorsement notice**

The text of ISO 16610-41:2015 has been approved by CEN as EN ISO 16610-41:2015 without any modification.

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

Part 41:

### **Morphological profile filters: Disk and horizontal line-segment filters**

*Spécification géométrique des produits (GPS) — Filtrage —*

*Partie 41: Filtres de profil morphologiques: Filtre disque et filtre  
segment de droite horizontal*



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**ISO 16610-41:2015(E)**



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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>vi</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 Morphological filters</b> .....	<b>1</b>
4.1 General.....	1
4.2 Discrete representation of input data.....	2
4.3 Discrete representation of structuring element.....	2
4.4 Discrete morphological filters.....	3
4.5 Discrete envelope filters.....	10
4.6 End conditions.....	10
<b>5 Recommendations</b> .....	<b>11</b>
5.1 Circular disk structuring element.....	11
5.2 Horizontal line structuring element.....	11
5.3 Default morphological filter.....	11
<b>6 Filter designation</b> .....	<b>11</b>
<b>Annex A (informative) Relationship to the filtration matrix model</b> .....	<b>12</b>
<b>Annex B (informative) Relationship to the GPS matrix model</b> .....	<b>13</b>
<b>Bibliography</b> .....	<b>14</b>

## ISO 16610-41:2015(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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This first edition cancels and replaces ISO/TS 16610-41:2006 which has been technically revised.

ISO 16610 consists of the following parts, under the general title *Geometrical product specifications (GPS) — Filtration*:

- *Part 1: Overview and basic concepts*
- *Part 20: Linear profile filters: Basic concepts*
- *Part 21: Linear profile filters: Gaussian filters*
- *Part 22: Linear profile filters: Spline filters*
- *Part 28: Profile filters: End effects*
- *Part 29: Linear profile filters: Spline wavelets*
- *Part 30: Robust profile filters: Basic concepts*
- *Part 31: Robust profile filters: Gaussian regression filters*
- *Part 32: Robust profile filters: Spline filters*
- *Part 40: Morphological profile filters: Basic concepts*
- *Part 41: Morphological profile filters: Disk and horizontal line-segment filters*
- *Part 49: Morphological profile filters: Scale space techniques*
- *Part 60: Linear areal filters: Basic concepts*
- *Part 61: Linear areal filters: Gaussian filters*

- *Part 71: Robust areal filters: Gaussian regression filters*
- *Part 85: Morphological areal filters: Segmentation*

The following parts are planned:

- *Part 26: Linear profile filters: Filtration on nominally orthogonal grid planar data sets*
- *Part 27: Linear profile filters: Filtration on nominally orthogonal grid cylindrical data sets*
- *Part 45: Morphological profile filters: Segmentation*
- *Part 62: Linear areal filters: Spline filters*
- *Part 69: Linear areal filters: Spline wavelets*
- *Part 70: Robust areal filters: Basic concepts*
- *Part 72: Robust areal filters: Spline filters*
- *Part 80: Morphological areal filters: Basic concepts*
- *Part 81: Morphological areal filters: Sphere and horizontal planar segment filters*
- *Part 89: Morphological areal filters: Scale space techniques*

## **ISO 16610-41:2015(E)**

### **Introduction**

This part of ISO 16610 is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 3 and 5 in the GPS matrix structure..

The ISO/GPS Masterplan given in ISO 14638 gives an overview of the ISO/GPS system of which this part of ISO 16610 is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this part of ISO 16610 and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this part of ISO 16610, unless otherwise indicated.

For more detailed information about the relation of this part of ISO 16610 to the GPS matrix model, see [Annex B](#).

This part of ISO 16610 provides guidelines for computing profile morphological operations and filters with disk and horizontal segment structuring elements. It also describes techniques for applying morphological filters, including envelope filters, for open profiles.

# Geometrical product specifications (GPS) — Filtration —

## Part 41:

## Morphological profile filters: Disk and horizontal line-segment filters

### 1 Scope

This part of ISO 16610 specifies techniques for computing morphological filters with disk and horizontal segment structuring elements, including envelope filters.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14660-1, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

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

ISO 16610-40, *Geometrical product specifications (GPS) — Filtration — Part 40: Morphological profile filters: Basic concepts*

### 3 Terms and definitions

For the purposes of this document, the terms and definition given in ISO 14660-1, ISO 16610-1, and ISO 16610-40 apply.

### 4 Morphological filters

#### 4.1 General

The morphological filters described in this part of ISO 16610 are defined using Minkowski sums. There are two primary morphological operations (dilation and erosion) and two secondary morphological operations (opening and closing). The opening and closing operators are also called morphological filters. Any technique that can compute Minkowski additions and subtractions can be used to compute closing and opening morphological filters and the respective envelope filters. Computation of morphological filters can be greatly simplified by using with discrete morphological filters, which are described in the rest of this part of ISO 16610. The main body of this part of ISO 16610 covers general computational techniques; [Annexes A](#) and [B](#) deal with specific implementations of discrete morphological operations and filters for profiles.

A morphological filter conforming to this part of ISO 16610 shall exhibit the characteristics described in [4.3](#), [4.4](#), [4.5](#), [4.6](#), [5.1](#), [5.2](#), and [5.3](#).

NOTE The relationship of morphological profile filters: disk and horizontal line-segment filters to the filtration matrix model is given in [Annex A](#).

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