

**Foods of plant origin - Multiresidue methods for the  
determination of pesticide residues by GC or LC-MS/MS -  
Part 1: General considerations**

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## English Version

# Foods of plant origin - Multiresidue methods for the determination of pesticide residues by GC or LC-MS/MS - Part 1: General considerations

Aliments d'origine végétale - Méthodes multirésidus de détermination de résidus de pesticides par CPG ou CL-SM/SM - Partie 1: Généralités

Pflanzliche Lebensmittel - Multiverfahren zur Bestimmung von Pestizidrückständen mit GC oder LC-MS/MS - Teil 1: Allgemeines

This European Standard was approved by CEN on 21 September 2013.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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## Foreword

This document (EN 12393-1:2013) has been prepared by Technical Committee CEN/TC 275 "Food analysis - Horizontal methods", 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of an identical text or by endorsement, at the latest by May 2014, and conflicting national standards shall be withdrawn at the latest by May 2014.

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.

This document supersedes EN 12393-1:2008.

The following significant technical changes have been made:

- a) separation of analytes by liquid chromatography with MS/MS-detection in methods N and P;
- b) incorporation of information on GC-MS/MS detection;
- c) deletion of method L as no longer in use;
- d) editorial updating of the document according to references, etc.

EN 12393, *Foods of plant origin — Multiresidue methods for the determination of pesticide residues by GC or LC-MS/MS* is divided into three parts:

- Part 1 "*General considerations*" provides general considerations with regard to reagents, apparatus, gas chromatography, etc., applying to each of the selected analytical methods;
- Part 2 "*Methods for extraction and clean-up*" presents methods M, N and P for the extraction and clean-up using techniques such as liquid-liquid partition, adsorption column chromatography or gel permeation column chromatography, etc.;
- Part 3 "*Determination and confirmatory tests*" gives some recommended techniques for the qualitative and the quantitative measurements of residues and the confirmation of the results.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

This European Standard comprises a range of multi-residue methods of equal status: no single method can be identified as the prime method because, in this field, methods are continuously developing. The selected methods included in this European Standard have been validated and/or are widely used throughout Europe.

Because these methods can be applied to the very wide range of food commodities/pesticide combinations, using different systems for determination, there are occasions when variations in equipment used, extraction, clean-up and chromatographic conditions are appropriate to improve method performance, see 3.1.

## 1 Scope

This European Standard gives general considerations for the determination of pesticide residues in foods of plant origin.

Each method specified in this European Standard is suitable for identifying and quantifying a definite range of those organohalogen, and/or organophosphorus and/or organonitrogen pesticides which occur as residues in foodstuffs of plant origin.

This European Standard contains the following methods that have been subjected to interlaboratory studies and/or are adopted throughout Europe:

- method M: Extraction with acetone and liquid-liquid partition with dichloromethane/light petroleum, if necessary clean-up on Florisil® <sup>1)</sup> [1], [2], [3];
- method N: Extraction with acetone, liquid-liquid partition with dichloromethane or cyclohexane/ethyl acetate and clean-up with gel permeation and silica gel chromatography [4], [5];
- method P: Extraction with ethyl acetate and, if necessary, clean-up with gel permeation chromatography [6].

The applicability of the three methods M, N and P for residue analysis of organohalogen, organophosphorus and organonitrogen pesticides, respectively, is given for each method.

## 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.

EN 12393-2:2013, *Foods of plant origin — Multiresidue methods for the determination of pesticide residues by GC or LC-MS/MS — Part 2: Methods for extraction and clean-up*

EN 12393-3:2013, *Foods of plant origin — Multiresidue methods for the determination of pesticide residues by GC or LC-MS/MS — Part 3: Determination and confirmatory tests*

## 3 Principle

### 3.1 General

As already described in the introduction, in certain occasions it is possible to improve the method performance by variations in equipment used, extraction, clean-up and chromatographic conditions. Such variations shall always be clearly documented and demonstrated to give valid results.

The methods described in this European Standard are based on a four-stage process (in some cases two stages may be combined, in whole or in part), as given in 3.2 to 3.5.

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1) Florisil® is an example of a suitable product available commercially. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of this product.