SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 17791:2021

01-december-2021

[Not translated]

Inorganic fertilizers - Determination of chelating and complexing agents

Anorganische Düngemittel - Bestimmung von Chelat- und Komplexbildnern

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Ta slovenski standard je istoveten z: **FprCEN/TS 17791**

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ICS:

65.080 Gnojila Fertilizers

kSIST-TS FprCEN/TS 17791:2021 **en,fr,de**

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English Version

Inorganic fertilizers - Determination of chelating and complexing agents

Engrais inorganiques - Détermination des agents chélatants et complexants

Anorganische Düngemittel - Bestimmung von Chelat- und Komplexbildnern

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 260.

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kSIST-TS FprCEN/TS 17791:2021

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
kSIST-TS FprCEN/TS 17791:2021
https://standards.iteh.ai/catalog/standards/sist/5cbf58e2-d5b8-4a91-8a2d-41fdca52898a/ksist-ts-fprcen-ts-17791-2021

kSIST-TS FprCEN/TS 17791:2021

European foreword

This document (FprCEN/TS 17791:2021) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials” the secretariat of which is held by DIN.

This document is currently submitted to the Vote on TS.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

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kSIST-TS FprCEN/TS 17791:2021
https://standards.iteh.ai/catalog/standards/sist/5cbf58e2-d5b8-4a91-8a2d-41fdca52898a/ksist-ts-fprcen-ts-17791-2021

kSIST-TS FprCEN/TS 17791:2021

Introduction

Regulation (EU) 2019/1009 [1] lays down the rules on the making available on the market of EU fertilizing products and the specific safety and quality requirements for the defined product function categories (PFCs).

Inorganic fertilizers have been classified into PFC 1(C), which has been divided into two groups PFC 1(C)(I) [inorganic macronutrients fertilizers] and PFC 1(C)(II) [inorganic micronutrient fertilizers].

Micronutrients are considered to be, in plant nutrition, a number of elements known to be needed in small amounts for proper plant growth and development. The most common are Iron (Fe), Manganese (Mn), Molybdenum (Mo), Copper (Cu), Zinc (Zn) and Boron (B).

If an inorganic micronutrient fertilizer contains a substance, or one of the substances in the mixture, which is intended to enhance the long term availability to plants of micronutrients in the EU fertilizing product, that substance is either a chelating agent or a complexing agent.

The specific safety and quality requirements in relation to the determination of chelating and complexing agents in inorganic micronutrient fertilizers (PFC 1(C)(II)) are defined in this document as well as the normative references of the test methods to be used in order to measure the compliance with the related requirement in the Regulation (EU) 2019/1009 [1].

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kSIST-TS FprCEN/TS 17791:2021
https://standards.iteh.ai/catalog/standards/sist/5cbf58e2-d5b8-4a91-8a2d-41fdca52898a/ksist-ts-fprcen-ts-17791-2021

kSIST-TS FprCEN/TS 17791:2021

1 Scope

This document specifies references to the methods for the determination of specific micronutrients, chelating and complexing agents. The document specifies references to the methods and requirements for inorganic micronutrient fertilizers in accordance with PFC 1 (C) (II) as specified in the Regulation (EU) 2019/1009 [1].

Inorganic micronutrient materials for this purpose are micronutrient salts or oxide and hydroxides, or micronutrient chelates or complexes and mixtures of them, in powder or granular form, aqueous or suspension preparation.

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.

EN 1482-1:2007, *Fertilizers and liming materials - Sampling and sample preparation - Part 1: Sampling*

EN 1482-2:2007, *Fertilizers and liming materials - Sampling and sample preparation - Part 2: Sample preparation*

EN 12944-1:1999, *Fertilizers and liming materials and soil improvers - Vocabulary - Part 1: General terms*

EN 12944-2:1999, *Fertilizers and liming materials and soil improvers - Vocabulary - Part 2: Terms relating to fertilizers*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

EN 13368-1:2014, *Fertilizers - Determination of chelating agents in fertilizers by chromatography - Part 1: Determination of EDTA, HEEDTA and DTPA by ion chromatography*

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EN 13368-2:2017, *Fertilizers - Determination of chelating agents in fertilizers by chromatography - Part 2: Determination of Fe chelated by [o,o] EDDHA, [o,o] EDDHMA and HBED, or the amount of chelating agents, by ion pair chromatography*

EN 13368-3:2017, *Fertilizers - Determination of chelating agents in fertilizers by chromatography - Part 3: Determination of [S,S]–EDDS by ion par chromatography*

EN 15451:2008, *Fertilizers - Determination of chelating agents - Determination of iron chelated by EDDHSA by ion pair chromatography*

EN 15452:2008, *Fertilizers - Determination of chelating agents - Determination of iron chelated by o,p-EDDHA by reversed phase HPLC*

EN 15950:2010, *Fertilizers - Determination of N-(1,2-dicarboxyethyl)-D,L-aspartic acid (Iminodisuccinic acid, IDHA) using high-performance liquid chromatography (HPLC)*

EN 15962:2011, *Fertilizers - Determination of the complexed micro-nutrient content and of the complexed fraction of micro-nutrients*

EN 16109:2011, *Fertilizers - Determination of complexed micro-nutrient ions in fertilizers - Identification of lignosulfonates*

EN 16847:2016, *Fertilizers - Determination of complexing agents in fertilizers - Identification of heptagluconic acid by chromatography*

kSIST-TS FprCEN/TS 17791:2021

FprCEN/TS 17764:2021, *Inorganic micronutrient fertilizers - Determination of the concentration of free, chelated or complexed micronutrients and the chelating and/or complexing agent present in compound inorganic micronutrient fertilizers*

FprCEN/TS 17786-1:2021, *Inorganic micronutrient fertilizers - Determination of the chelated micronutrient content and the chelated fraction of micronutrients - Part 1: Treatment with a cation exchange resin*

FprCEN/TS 17786-2:2021, *Inorganic micronutrient fertilizers - Determination of the chelated micronutrient content and the chelated fraction of micronutrients - Part 2: Determination of EDTA, DTPA, HEEDTA, IDHA or EDDS*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12944-1:1999 and EN 12944-2:1999 apply.

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

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

4 Sampling and sample preparation

4.1 Sampling

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Samples taken for quality control purposes shall be representative, as described in EN 1482-1:2007.

4.2 Sample preparation

kSIST-TS FprCEN/TS 17791:2021
https://standards.iteh.ai/catalog/standards/sist/5cbf58e2-d5b8-4a91-8a2d-41fdca52898a/ksist-ts-fprcen-ts-17791-2021

Sample preparation for quality control purposes shall be in accordance with EN 1482-2:2007.

5 Requirements

5.1 General

The requirements for the determination of chelating and complexing agents in inorganic fertilizers according to PFC 1(C)(II) and CMC 1 of Regulation (EU) 2019/1009 [1] shall be evaluated by using the analytical methods referred to in 5.2 to 5.5 (see Table 1).

5.2 Determination of the fraction of chelated micronutrients

5.2.1 General

Relevant analytical methods for the determination of the fraction of chelated micronutrients in inorganic fertilizers are specified in 5.2.2 and 5.2.3.

5.2.2 Determination of the fraction of chelated iron in inorganic micronutrient fertilizers containing UVCB iron chelates

The determination of the fraction of the chelated iron in UVCB iron chelates shall be determined according to FprCEN/TS 17786-1:2021.

For compound inorganic fertilizers, FprCEN/TS 17764:2021 shall be used.

kSIST-TS FprCEN/TS 17791:2021

5.2.3 Determination of the fraction chelated micronutrients in inorganic micronutrient chelate fertilizers

The determination of the fraction of chelated micronutrients shall be determined according to FprCEN/TS 17786-2:2021.

For compound inorganic fertilizers, FprCEN/TS 17764:2021 shall be used.

5.3 Identification of chelating agents

5.3.1 General

Relevant analytical methods for the identification of chelating agents in inorganic fertilizers are specified in 5.3.2 and 5.3.3.

5.3.2 Identification of UVCB iron chelates

The identification of the chelating agents in a UVCB (unknown or variable composition, complex reaction products and biological materials) iron chelate shall be determined according to EN 13368-2:2017, EN 15451:2008 or EN 15452:2008 depending on the chelating agent declared.

5.3.3 Identification of micronutrient chelate fertilizers

The identification of the chelating agents in a micronutrient chelate fertilizers shall be determined according to EN 13368-1:2014, EN 13368-3:2017 or EN 15950:2010 depending on the chelating agent declared.

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5.4 Determination of the fraction of complexed micronutrients

The determination of the complexing agents in an inorganic micronutrient chelate fertilizers shall be determined according to EN 15962:2011 and FprCEN/TS 17764 for compound inorganic fertilizers.

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5.5 Identification of complexing agents

The identification of the complexing agents in an inorganic micronutrient complexed fertilizers shall be determined according to EN 16109:2011 or EN 16847:2016 depending on the complexing agent declared.

kSIST-TS FprCEN/TS 17791:2021

Table 1 — References to methods for the determination of the chelated/complexed fraction and the identification of the different chelating/complexing agents in inorganic fertilizers

Parameter	Reference
Determination of the fraction of chelated iron in inorganic micronutrient fertilizers containing UVCB iron chelates	FprCEN/TS 17786-1:2021
Determination of the fraction of chelated micronutrient in inorganic micronutrient chelate fertilizers	FprCEN/TS 17786-2:2021
Determination of the concentration of free, chelated or complexed micronutrient and the chelating and/or complexing agents present in compound inorganic micronutrient fertilizers	FprCEN/TS 17764:2021
Identification of chelating agents: UVCB iron chelates	
Determination of Fe chelated by [o,o] EDDHA[a], [o,o] EDDHMA[b] and HBED[c], or the amount of chelating agents, by ion pair chromatography	EN 13368-2:2017
Determination of iron chelated by EDDHSA[d] by ion pair chromatography	EN 15451:2008
Determination of iron chelated by [o,p]-EDDHA[e] by reversed phase high-performance liquid chromatography (HPLC)	EN 15452:2008
Identification of chelating agents in micronutrient chelate fertilizers	
Determination of EDTA[f], HEEDTA[g] and DTPA[h] by ion chromatography	EN 13368-1:2014
Determination of [S,S]-EDDS[i] by ion pair chromatography	EN 13368-3:2017
Determination of N-(1,2-dicarboxyethyl)-D,L-aspartic acid (Iminodisuccinic acid, IDHA) using HPLC	EN 15950:2010
Determination of the fraction of complexed micronutrients	EN 15962:2011
Identification of complexing agents	
Identification of lignosulfonates	EN 16109:2011
Identification of heptagluconic acid by chromatography	EN 16847:2016

[a] Ethylenediamine-N,N'-di[(*ortho*-hydroxyphenyl)acetic acid], $C_{18}H_{20}O_6N_2$

[b] Ethylenediamine-N,N'-di[(*ortho*-hydroxymethylphenyl) acetic acid], $C_{20}H_{24}O_6N_2$

[c] N,N'-bis(2-hydroxybenzyl)-ethylenediamine-N,N'-diacetic acid, $C_{20}H_{24}O_6N_2$

[d] Ethylenediamine-N,N'-di-[(2-hydroxy-5-sulfophenyl)acetic acid] and its condensation products, $C_{18}H_{20}O_{12}N_2S_2$ + n*($C_{12}H_{14}O_8N_2S$)

[e] Ethylenediamine-N-[(*ortho*-hydroxyphenyl)acetic acid]-N'-[(*para*-hydroxyphenyl)acetic acid], $C_{18}H_{20}O_6N_2$

[f] Ethylenediaminetetraacetic acid, $C_{10}H_{16}O_8N_2$

[g] 2-hydroxyethylethylenediaminetriacetic acid, $C_{10}H_{18}O_7N_2$

[h] Diethylenetriaminepentaacetic acid, $C_{14}H_{23}O_{10}N_3$

[i] [S,S]-Ethylenediaminedisuccinic acid, $C_{18}H_{20}O_6N_2$

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(standards.iteh.ai)
kSIST-TS FprCEN/TS 17791:2021
https://standards.iteh.ai/catalog/standards/sist/5cbf58e2-d5b8-4a91-8a2d-41fdca52898a/ksist-ts-fprcen-ts-17791-2021