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**Kakovost tal - Določevanje efektivne kationske izmenjalne kapacitete (KIK) in izmenljivih kationov z uporabo raztopine heksaminokobaltovega triklorida (ISO 23470:2007)**

Soil quality - Determination of effective cation exchange capacity (CEC) and exchangeable cations using a hexamminecobalt trichloride solution (ISO 23470:2007)

Bodenbeschaffenheit - Bestimmung der effektiven Kationenaustauschkapazität (KAK) und der austauschbaren Kationen mit Hexammin-cobalt-trichlorid-Lösung (ISO 23470:2007)

Qualité du sol - Détermination de la capacité d'échange cationique (CEC) effective et des cations échangeables à l'aide d'une solution de trichlorure de cobaltihexammine (ISO 23470:2007)

**Ta slovenski standard je istoveten z: EN ISO 23470:2011**

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**ICS:**

13.080.10      Kemijske značilnosti tal      Chemical characteristics of soils

**SIST EN ISO 23470:2011**      **en,fr,de**

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EUROPEAN STANDARD

EN ISO 23470

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English Version

Soil quality - Determination of effective cation exchange capacity  
(CEC) and exchangeable cations using a hexammincobalt  
trichloride solution (ISO 23470:2007)

Qualité du sol - Détermination de la capacité d'échange  
cationique (CEC) effective et des cations échangeables à  
l'aide d'une solution de trichlorure de cobaltihexammine  
(ISO 23470:2007)

Bodenbeschaffenheit - Bestimmung der effektiven  
Kationenaustauschkapazität (KAK) und der  
austauschbaren Kationen mit Hexammin-cobalt-trichlorid-  
Lösung (ISO 23470:2007)

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## Foreword

The text of ISO 23470:2007 has been prepared by Technical Committee ISO/TC 190 "Soil quality" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 23470:2011 by Technical Committee CEN/TC 345 "Characterization of soils" the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by December 2011, and conflicting national standards shall be withdrawn at the latest by December 2011.

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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**Soil quality — Determination of effective  
cation exchange capacity (CEC) and  
exchangeable cations using a  
hexamminecobalt trichloride solution**

*Qualité du sol — Détermination de la capacité d'échange cationique  
(CEC) effective et des cations échangeables à l'aide d'une solution de  
trichlorure de cobaltihexammine*

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**ISO 23470:2007(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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 23470 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

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# Soil quality — Determination of effective cation exchange capacity (CEC) and exchangeable cations using a hexamminecobalt trichloride solution

## 1 Scope

This International Standard specifies a method for the determination of the cation exchange capacity (CEC) and the content of exchangeable cations ( $\text{Al}^{3+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Na}^+$ ) in soils using a hexamminecobalt trichloride solution as extractant.

NOTE As the pH of a soil suspension in the hexamminecobalt trichloride solution is close to the pH of the suspension in water, this method is considered to give the effective CEC, i.e. the CEC at the soil pH.

This International Standard is applicable to all types of air-dried soil samples which have been prepared in accordance with ISO 11464.

References and results of the comparison with other methods (barium chloride, ammonium acetate) are given in Annex A.

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## 2 Normative references

The following referenced documents are indispensable for the application 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 11464, *Soil quality — Pretreatment of samples for physico-chemical analysis*

## 3 Principle

Cations retained by a soil sample are exchanged with the hexamminecobalt ions of an aqueous solution, with shaking for  $60 \text{ min} \pm 5 \text{ min}$  at a temperature of  $20 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ . The CEC is obtained by difference between the initial quantity of hexamminecobalt in solution and the quantity remaining in the extract after the exchange reaction. The measurement of hexamminecobalt concentration in the extract can be performed by direct spectrophotometric measurement, or by the determination of total ammonium nitrogen or total cobalt concentrations.

The quantities of exchanged cations are determined on the same extract using spectrometric methods, such as inductively coupled plasma atomic emission spectrometry (ICP-AES).

NOTE 1 Exchangeable acidity can also be measured in the hexamminecobalt extract.

NOTE 2 When exchangeable cations are held in micropores into which ammonium ions but not hexamminecobalt ions can enter, the CEC and exchangeable cation values determined with this method may be smaller than those determined by the ammonium acetate method. This has been observed in some soils containing allophane and imogolite, for example soils developed on volcanic rocks.