

DIN EN ISO 28258

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**Bodenbeschaffenheit –
Digitaler Austausch bodenbezogener Daten (ISO 28258:2013);
Englische Fassung EN ISO 28258:2013, nur auf CD-ROM**

Soil quality –

Digital exchange of soil-related data (ISO 28258:2013);

English version EN ISO 28258:2013, only on CD-ROM

Qualité du sol –

Échange numérique de données relatives au sol (ISO 28258:2013);

Version anglaise EN ISO 28258:2013, seulement en CD-ROM

Gesamtumfang 79 Seiten

Normenausschuss Wasserwesen (NAW) im DIN

Nationales Vorwort

Dieses Dokument (EN ISO 28258:2013) wurde von dem Technischen Komitee ISO/TC 190 „Soil quality“ (Sekretariat: NEN, Niederlande) in Zusammenarbeit mit dem Technischen Komitee CEN/TC 345 „Charakterisierung von Böden“ (Sekretariat: NEN, Niederlande) erarbeitet.

Das zuständige deutsche Normungsgremium ist der Unterausschuss NA 119-01-02-03 UA „Standortbeurteilung“ im Normenausschuss Wasserwesen (NAW) im DIN.

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den europäischen Regeln zur Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmen abgewichen und auf die deutsche Sprachfassung verzichtet werden kann.

Die Genehmigung dafür hat die DIN-Geschäftsleitung, entsprechend ihren in Anlage 1 zu dem DIN-Rundschreiben A 5/204 festgelegten Kriterien, für die vorliegende Norm auf Antrag des NA 119-01 FBR „Fachbereichsausschuss Umwelt (Abfall, Boden, Wasser)“ erteilt.

Auf die deutsche Sprachfassung wurde aus folgendem Grund verzichtet:

ISO 28258 beschreibt den internationalen Datenaustausch von Bodendaten für Personen, Organisationen und vor allem zwischen Datenbanken. Alle hierfür nötigen Befehle und Beschreibungen werden ausschließlich in englischer Sprache verwendet. Daher würde eine Übersetzung in die deutsche Sprache zu unnötigen Fehlern und einer Sprachverwirrung führen, anstatt den Inhalt dieses Dokuments zu verdeutlichen.

Für die in diesem Dokument zitierten europäischen und internationalen Normen wird im Folgenden auf die entsprechenden Deutschen Normen hingewiesen:

ISO 15903	siehe	DIN ISO 15903
ISO 19106	siehe	DIN EN ISO 19106
ISO 19109	siehe	DIN EN ISO 19109
ISO 19118	siehe	DIN EN ISO 19118
ISO 19136	siehe	DIN EN ISO 19136
ISO 19156	siehe	DIN EN ISO 19156
ISO 25177	siehe	DIN EN ISO 25177

Nationaler Anhang NA (informativ)

Literaturhinweise

DIN EN ISO 3166-1, *Codes für die Namen von Ländern und deren Untereinheiten — Teil 1: Codes für Ländernamen*

DIN ISO 7168-1, *Luftbeschaffenheit — Datenaustausch — Teil 1: Allgemeines Datenformat*

DIN ISO 7168-2, *Luftbeschaffenheit — Datenaustausch — Teil 2: Komprimiertes Datenformat*

DIN ISO 10381-1, *Bodenbeschaffenheit — Probenahme — Teil 1: Anleitung zur Aufstellung von Probenahmeprogrammen*

DIN ISO 10381-2, *Bodenbeschaffenheit — Probenahme — Teil 2: Anleitung für Probenahmeverfahren*

DIN ISO 10381-3, *Bodenbeschaffenheit — Probenahme — Teil 3: Anleitung zur Sicherheit*

DIN ISO 10381-4, *Bodenbeschaffenheit — Probenahme — Teil 4: Anleitung für das Vorgehen bei der Untersuchung von natürlichen, naturnahen und Kulturstandorten*

DIN ISO 10381-5, *Bodenbeschaffenheit — Probenahme — Teil 5: Anleitung für die Vorgehensweise bei der Untersuchung von Bodenkontaminationen auf urbanen und industriellen Standorten*

DIN ISO 10381-6, *Bodenbeschaffenheit — Probenahme — Teil 6: Anleitung zur Entnahme, Behandlung und Lagerung von Boden unter aeroben Bedingungen für die Beurteilung mikrobiologischer Prozesse sowie der Biomasse und der Diversität unter Laboratoriumsbedingungen*

DIN ISO 10381-7, *Bodenbeschaffenheit — Probenahme — Teil 7: Anleitung zur Entnahme von Bodenluftproben*

DIN EN ISO 9000, *Qualitätsmanagementsysteme — Grundlagen und Begriffe*

DIN EN ISO 19107, *Geoinformation — Raumbezugsschema*

DIN EN ISO 19108, *Geoinformation — Zeitliches Schema*

DIN EN ISO 19115, *Geoinformation — Metadaten*

DIN EN ISO 9241-151, *Ergonomie der Mensch-System-Interaktion — Teil 151: Leitlinien zur Gestaltung von Benutzungsschnittstellen für das World Wide Web*

DIN EN ISO 19101-1, *Geoinformation – Referenzmodell — Teil 1: Grundsätze*

DIN EN ISO 80000-1, *Größen und Einheiten — Teil 1: Allgemeines*

DIN SPEC 1135 (DIN ISO/TS 19139), *Geoinformation — Metadaten — XML-Schema Implementierung*

DIN IEC 62198, *Risikomanagement für Projekte — Anwendungsleitfaden*

Die im englischen Teil dieser Norm unter [1] gelistete ISO 1000 wurde zurückgezogen und durch ISO 80000-1 ersetzt.

Nationaler Anhang NB (informativ)

Übersetzung der Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach ISO 11074 und ISO 19109 und die folgenden Begriffe.

3.1

Analyse

(en: analysis)

Prozess, bei dem eine Probe auf ihre Zusammensetzung oder ihre Beschaffenheit nach einem beschriebenen Verfahren untersucht wird

Anmerkung 1 zum Begriff: Analysen erfolgen mehrheitlich an entnommenen Proben, können jedoch ebenfalls *in-situ* durchgeführt werden.

3.2

Analyseergebnis

(en: analytical result)

durch Analyse erhaltene qualitative oder quantitative Charakteristiken (Merkmale) eines Materials

3.3

Anwendungsschema

(en: application schema)

konzeptionelles Schema für Daten, die für eine oder mehrere Anwendungen erforderlich sind

[QUELLE: ISO 19101]

3.4

Attribut

(en: attribute)

Charakteristik eines Merkmals

Anmerkung 1 zum Begriff: Objekte und Einheiten (siehe ISO 11179) sind im Sinne dieser Norm Merkmale.

3.5

Bohrloch

Bohrung

(en: borehole, Synonyms: boring and bore)

Abteufung in den Untergrund mit Entfernung von Boden/Gesteinsmaterial aus einem Bohrloch durch Einsatz von motorgetriebenen Bohrgeräten, z. B. Hohlbohrverfahren

Anmerkung 1 zum Begriff: Die Abteufung erfolgt üblicherweise vertikal.

[QUELLE: ISO 11074]

3.6

Klasse

(en: class)

Beschreibung einer Objektmenge, welche dieselben Attribute, Operationen, Methoden, Beziehungen und Semantiken teilen

[QUELLE: ISO/IEC 19501]

3.7**Code**

(en: code)

Datenelement einer Codeliste

3.8**Codeliste**

(en: code list)

definierte Reihe gültiger Werte eines Attributparameters

3.9**Datenmodell**

(en: data model)

Beschreibung der Organisation von Daten auf eine Weise, die eine Informationsstruktur widerspiegelt

3.10**erweiterbare Auszeichnungssprache****XML**

(en: extensible mark up language (XML))

Untergruppe der SGML (Standard Generalized Markup Language), die semantische Tags in einem strukturierten Format nutzt

Anmerkung 1 zum Begriff: SML bietet eine flexible Möglichkeit zur Erschaffung von Informationsformaten und zum Austausch von Daten und Metadaten mit anderen Anwendern.

Anmerkung 2 zum Begriff: Siehe ISO 13374-2.

3.11**Objekt**

(en: feature)

Abstraktion der Wahrnehmung eines Ereignisses

[QUELLE: ISO 19101]

Anmerkung 1 zum Begriff: Ein Objekt hat eine Identität und Eigenschaften (es kann mittels Attributen beschrieben werden).

Anmerkung 2 zum Begriff: Jedes Objekt ist eine Ausprägung eines Objekttyps, z. B. sind mehrere beschriebene reale Bodenprofile Objekte des Objekttyps Bodenprofil.

3.12**Objektkatalog**

(en: feature catalogue)

Katalog(e), der/die Definitionen und Beschreibungen von Objekttypen enthält/enthalten

3.13**Objekttyp**

(en: feature type)

Klasse von Objekten mit gemeinsamen Merkmalen

[QUELLE: ISO 19156]

Anmerkung 1 zum Begriff: Für diese Internationale Norm wird davon ausgegangen, dass geographische und bodenbeschaffenheitsbezogene reale Daten und Abstraktionen Objekte sein können.

3.14

Auszeichnungssprache zum Austausch raumbezogener Objekte

GML

(en: geography markup language (GML))

XML-Kodierung in Übereinstimmung mit ISO 19118 und insbesondere mit ISO 19136 für die Weiterleitung und Speicherung geographischer Informationen, die nach dem konzeptuellen Rahmenmodell der Serie ISO 19100 modelliert sind und sowohl raumbezogene wie nicht-raumbezogene Eigenschaften geographischer Merkmale umfassen

3.15

Horizont

(en: horizon)

Bereich eines Bodens mit einer bestimmten vertikalen Ausdehnung, der mehr oder weniger parallel zur Oberfläche verläuft und mit Bezug auf die meisten morphologischen und analytischen Merkmale homogen ist, entstanden aus dem Ausgangsmaterial durch pedogene Prozesse oder aus *in-situ* abgelagerten organischen Rückständen wachsender Pflanzen (Torf)

3.16

Schicht

(en: layer)

Bereich eines Bodens mit einer bestimmten vertikalen Ausdehnung, der durch nicht-pedogene Prozesse entstanden ist, und diskordant zu möglichen darüber oder darunter angrenzenden Bereichen liegt

Anmerkung 1 zum Begriff: Im Zusammenhang mit Böden, die einer erheblichen Veränderung durch menschliche Aktivitäten unterliegen, sind künstliche Schichten aus verschiedenen Arten von Ablagerungen möglich (Beton, Ziegel usw.).

Anmerkung 2 zum Begriff: Schichten können Teil eines Horizonts sein.

3.17

Metadaten

(en: metadata)

Daten, die andere Daten definieren und beschreiben

[QUELLE: ISO/IEC 11179-1:2004]

Anmerkung 1 zum Begriff: Metadaten sind Daten – und Daten werden zu Metadaten wenn sie in diesem Sinne benutzt werden. Dies erfolgt unter besonderen Umständen, für bestimmte Zwecke, und für bestimmte Perspektiven. Die Reihe von Umständen, Zwecken oder Perspektiven, für die einige Daten als Metadaten benutzt werden, wird Kontext genannt (siehe ISO/IEC 11179-1).

Anmerkung 2 zum Begriff: Andererseits können einige Metadaten den Kontext bereitstellen zur Interpretation der Daten, die sich auf sie beziehen, z. B. erlauben Maßeinheiten eine Abschätzung, wie Messwerte zu interpretieren sind.

Anmerkung 3 zum Begriff: Diese Definition ist ähnlich der Definition zu „Daten über Daten“, wie in ISO 19115 und anderen internationalen Normen definiert.

3.18

zerstörungsfreie Untersuchung

(en: non-destructive investigation)

Anwendung einer Reihe von Prozessen oder Techniken zum Gewinnen von Beobachtungen an einem Material, ohne dessen physische Struktur und chemische Merkmale nachhaltig zu verändern

3.19

Beobachtung

(en: observation)

Vorgang der Beobachtung einer Eigenschaft, mit dem Ziel, einen Schätzwert dieser Eigenschaft zu erhalten

Anmerkung 1 zum Begriff: Diese Definition ist konform zur Definition des Begriffs *Beobachtung* in ISO 19156.

3.20**Parzelle**

(en: plot)

Gebiet, in dem individuelle Beobachtungen gemacht und/oder Proben entnommen werden

Anmerkung 1 zum Begriff: Alle Arten von Parzellen stellen nur eine raumbezogene, jedoch keine bodenbezogene Information dar. Zum Beispiel ist ein Bohrloch der Ort, an dem die Profilinformation erhalten werden.

3.21**Profilelement**

(en: profile element)

allgemeiner Begriff sowohl für Horizonte als auch Schichten

3.22**Projekt**

(en: project)

einmaliger Prozess, der aus mehreren abgestimmten und gesteuerten Tätigkeiten mit Anfangs- und Endterminen besteht und durchgeführt wird, um unter Berücksichtigung von Zeit, Kosten und Ressourcen ein Ziel zu erreichen, das spezifische Anforderungen erfüllt.

Anmerkung 1 zum Begriff: Ein Einzelprojekt kann Teil einer größeren Projektstruktur sein.

Anmerkung 2 zum Begriff: Bei einigen Projekten werden während des Projektverlaufs die Ziele verfeinert und die Produktmerkmale fortschreitend entsprechend festgelegt (siehe IEC 62198).

Anmerkung 3 zum Begriff: Daten können vorhanden oder neu sein.

Anmerkung 4 zum Begriff: Zweck und Ziel dieser Internationalen Norm ist die Sammlung und Interpretation von Bodendaten (siehe auch 3.23).

[QUELLE: ISO 9000:2000, Begriff 3.4.3 – modifiziert. Anmerkungen 2 bis 4 beziehen sich nur auf diese Internationale Norm]

3.23**Projekt**

(en: project)

<digitaler Austausch bodenbezogener Daten>Vorgang zur Sammlung von Bodendaten

3.24**Probe**

(en: sample)

aus Boden, Bodenlösung, Abwasser, Zwischenabfluss oder Bodenluft entnommenes festes, flüssiges, gasförmiges oder lebendes Material, das beschrieben oder analysiert werden soll

3.25**Probenahme**

(en: sampling)

Vorgang der Probengewinnung

3.26**Standort**

(en: site)

definierter Bereich, der Gegenstand einer Untersuchung zur Bodenbeschaffenheit ist

Anmerkung 1 zum Begriff: Ein Standort ist die Fläche um eine Parzelle.

3.27**Bodenobjekttypen**

(en: soil feature types)

spezielle Reihe von Objekttypen, die in dieser Internationalen Norm festgelegt sind

3.28**Bodenkörper**

(en: soil body)

künstliche, aber erkennbare dreidimensionale Einheit in einem Bodenkontinuum

3.29

Bodenkarte

(en: soil map)

zwei- oder dreidimensionale Darstellung eines Bodens oder seiner Eigenschaften für eine räumliche Erstreckung

3.30

Bodenkartiereinheit

(en: soil mapping unit)

Gesamtheit aller bodenbezogener Abgrenzungen, die durch ein eindeutiges Symbol, Farbe, Name oder andere Darstellung auf einer Karte identifiziert werden können

3.31

Bodenprofil

(en: soil profile)

beschreibbare Darstellung des Bodens, charakterisiert durch eine vertikale Abfolge von mehreren Horizonten oder mindestens einem Horizont, oder mehrerer Schichten des Ausgangsmaterials

Anmerkung 1 zum Begriff: Das Bodenprofil wird abstrahiert durch Beobachtungen in einer Profilgrube oder an einem Bohrloch.

3.32

Unterklasse

(en: subclass)

Klasse, beinhaltend Attribute, Operationen, Methoden, Beziehungen und Semantiken einer weiteren Klasse, mit einzelnen Einschränkungen oder Erweiterungen

Anmerkung 1 zum Begriff: Eine Instanz einer Unterklasse kann immer als Instanz der Ausgangsklasse angesehen werden.

3.33

Profilgrube

Schurf

(en: trial pit, test pit, trench)

Aufgrabung, die zur Durchführung von Profilbeschreibungen, Probenahmen und/oder Feldversuchen hergestellt wird

[QUELLE: ISO 11074]

3.34

URL

(en: Uniform resource locator (URL))

Bezeichnungsschema zur eindeutigen Zuordnung von Datenbeständen im Internet (wie z. B. Webseiten) durch Benennung der Adresse des Bestandes und des zu benutzenden Zugriffsprotokolls

[QUELLE: ISO 9241-151:2008]

3.35

URN

einheitlicher Name für Ressourcen

(en: Universal Resource Name (URN))

Code, der eine Dienstleistung oder eine Ressource im Internet identifiziert

[QUELLE: ISO 5127:2001]

3.36

UML

einheitliche Modellierungssprache

(en: unified modelling language (UML))

Typ eines Modellierungselements, das die Semantik des Metamodells erweitert

[QUELLE: ISO/IEC 19501]

3.37

XML-Schema Definition

XSD

(en: XML schema definition (XSD)

Extensible Schema Definition)

Reihe von Regeln, die ein XML-Dokument einhalten muss, um als „gültig“ im Sinne dieses Schema angesehen zu werden.

Anmerkung 1 zum Begriff: Wenn XML die Sprache ist, dann ist XSD eine besondere Definition der Anwendung der XML-Sprache.

Anmerkung 2 zum Begriff: XSD wird manchmal bezeichnet als „XML-Schema“.

— Leerseite —

English Version

Soil quality - Digital exchange of soil-related data
(ISO 28258:2013)

Qualité du sol - Échange numérique de données relatives
au sol (ISO 28258:2013)

Bodenbeschaffenheit - Digitaler Austausch
bodenbezogener Daten (ISO 28258:2013)

This European Standard was approved by CEN on 24 August 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 28258:2013) has been prepared by Technical Committee ISO/TC 190 “Soil quality” in collaboration with 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 April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

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Endorsement notice

The text of ISO 28258:2013 has been approved by CEN as EN ISO 28258:2013 without any modification.

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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 1, *Evaluation of criteria, terminology and codification*.

Introduction

Concerns about the future of soils are increasing. The quality of soils and the needs for soil protection are an issue of ever-increasing importance, in all countries. Whether it be for matters of land development, recycling of waste, for assessing the consequences of the way of use of soils on the quality of water or, more generally, the maintaining of their ability to guarantee the functions expected of them by society, it is becoming more and more necessary to know soils, to describe them and to analyse them. A large number of standards indicate how to carry out these descriptions and analyses. However, soil-related studies are usually conducted by specialized departments and their results have then to be forwarded to the requesting parties or to the administration. Furthermore, as regards the availability of environmental data for the public, the official services are solicited to put them online, including information related to soils.

Soil data are produced during projects which involve the description of soil and — often, but not necessarily — sampling and analysis. Soil properties are estimated for parts of a soil, which can be genetic horizons or depth classes. This vertical sequence composes a soil profile. The intensity of soil description, sampling and analysis varies greatly among projects. In addition, available metadata, sampling and analytical designs and nomenclatures vary as well.

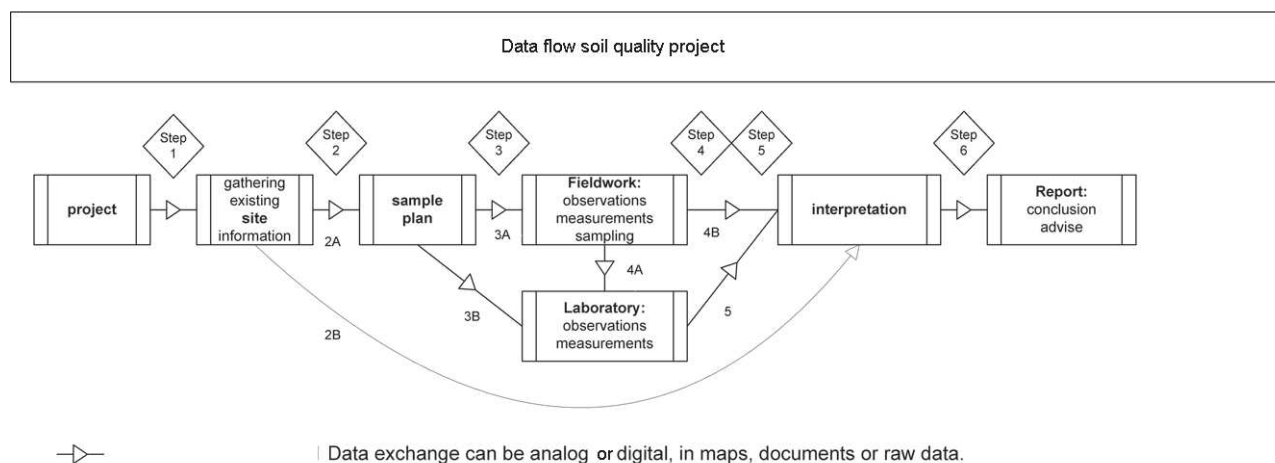
Due to this wide diversity of data and uses, the hardcopy (paper) form is nowadays rarely suitable, particularly when we consider that soil studies do not generally constitute an end in themselves but are only a part of the data required for the taking of land developmental or environmental-related decisions. Thus, soil data need to be crossed with other environmental, land-use or statistical data sources; the use of geographical information systems (GIS) is therefore essential. The purpose of this International Standard is to provide a general procedure to record all kinds of soil-related data in order to exchange them, while being consistent with relevant International Standards, but without any prerequisite for a given information system.

This International Standard proposes an eXtensible Markup Language (XML)-based format. XML consists of a set of rules for encoding information which is platform- and software-independent. A major advantage of using XML is that it is the standard for data transfer over the Internet. Most existing software tools and programming interfaces are designed to process and query XML files, to transform XML

into other data formats for further processing or display, and to transform XML to/from relational databases, whatever the purpose and the needs of the users. Moreover, a specific form of XML called GML is used for geographic information, promoting its exchange and use in combination with other environmental data.

Consequently, this International Standard contains information on how to encode soil data (metadata, soil description as well as geographic and temporal ones), including specifications and XML codes. In addition, and to make this International Standard “future-proof” between revisions, guidelines are provided for encoding of additional information not yet considered. These basic principles allow also the recipient system/user to read and/or decode information provided in a clear, safe and retrievable manner.

[Figure 1](#) shows the fluxes of soil data, generic to many kinds of applications that can be organized using this International Standard.



The boxes represent soil quality activities.
 The arrows represent data exchange steps between the activities.
 The figure shows that in an average soil quality project there might easily be 9 main stages where data is exchanged or stored.

Figure 1 — Common data exchanges in soil quality

Soil quality — Digital exchange of soil-related data

1 Scope

This International Standard describes how to digitally exchange soil-related data. It aims to facilitate the exchange of valid, clearly described and specified soil-related data between individuals and organizations via digital systems, and enables any soil data producer, holder or user to find and transfer data in an unambiguous way.

This International Standard contains definitions of features, several parameter specifications and encoding rules that allow consistent and retrievable data exchange. It also allows the explicit geo-referencing of soil data by building on other International Standards, thus facilitating the use of soil data within geographical information systems (GIS). Because soil data are of various origins and are obtained according to a huge variety of description and classification systems, this International Standard provides no attribute catalogue, but a flexible approach to the unified encoding of soil data by implementing the provisions of ISO 19156 observations and measurements (OM) for use in soil science.

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 11074, *Soil quality — Vocabulary*

ISO 15903, *Soil quality — Format for recording soil and site information*

ISO 19106:2004, *Geographic information — Profiles*

ISO 19109, *Geographic information — Rules for application schema*

ISO 19118, *Geographic information — Encoding*

ISO 19136, *Geographic information — Geography Markup Language (GML)*

ISO 19156:2011, *Geographic information — Observations and measurements*

ISO 25177:2008, *Soil quality — Field soil description*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11074 and in ISO 19109, and the following, apply.

3.1

analysis

process by which a sample is tested for composition or state according to a described procedure

Note 1 to entry: Most analyses are carried out on dislocated samples, but analyses can also be carried out on material *in situ*.

3.2

analytical result

qualitative or quantitative characteristic of a material obtained by an analysis

3.3
application schema

conceptual schema for data required by one or more applications

[SOURCE: ISO 19101.]

3.4
attribute
characteristic of a feature

Note 1 to entry: Objects and entities (see ISO 11179) are features in the context of this International Standard.

3.5
borehole
boring
bore
penetration into the subsurface with removal of soil/rock material by using, e.g. a hollow tube-shaped tool

Note 1 to entry: Generally, it is a vertical penetration.

[SOURCE: ISO 11074.]

3.6
class
description of a set of objects that share the same attributes, operations, methods, relationships, and semantics

[SOURCE: ISO/IEC 19501.]

3.7
code
member of a code list

3.8
code list
defined set of valid values of an attribute parameter

3.9
data model
description of the organization of data in a manner that reflects an information structure

3.10
extensible mark-up language
XML
subset of SGML (standard generalized markup language) which uses semantic tags in a structured format

Note 1 to entry: SML offers a flexible way to create information formats and to share both data and metadata with other applications and users.

Note 2 to entry: See ISO 13374-2.

3.11
feature
abstraction of a real world phenomenon

[SOURCE: ISO 19101.]

Note 1 to entry: A feature has identity and properties (it can be described with attributes).

Note 2 to entry: Any feature is an instantiation of a feature type, e.g. several described real-world soil profiles are all features of the feature type SoilProfile.

3.12

feature catalogue

catalogue(s) containing definitions and descriptions of feature types

3.13

feature type

class of features having common characteristics

[SOURCE: ISO 19156.]

Note 1 to entry: For this International Standard, it is considered that both geographic and soil quality related real-world and abstract objects can be features.

3.14

geography markup language

GML

XML encoding in compliance with ISO 19118 and, more specifically, ISO 19136 for the transport and storage of geographic information modelled according to the conceptual modelling framework used in the ISO 19100 family of International Standards and including both the spatial and non-spatial properties of geographic features

3.15

horizon

domain of a soil with a certain vertical extension, which is more or less parallel to the surface and is homogeneous for most morphological and analytical characteristics, developed in a parent material through pedogenic processes or made up of *in situ* sedimented organic residues of up-growing plants (peat)

3.16

layer

domain of a soil with a certain vertical extension developed through non-pedogenic processes, displaying an unconformity to possibly over- or underlying adjacent domains

Note 1 to entry: In the framework of soils deeply modified by human activity, artificial layers may be due to different kinds of deposits (concrete, bricks, etc.).

Note 2 to entry: Layers may be part of a horizon.

3.17

metadata

data that defines and describes other data

[SOURCE: ISO/IEC 11179-1:2004]

Note 1 to entry: Metadata are data, and data become metadata when they are used as defined. This happens under particular circumstances, for particular purposes, and with certain perspectives. The set of circumstances, purposes or perspectives for which some data are used as metadata is called the *context* (see ISO/IEC 11179-1).

Note 2 to entry: In turn, some metadata may provide the context for the interpretation of the data they are related to, e.g. units of measurement give an idea how to interpret the measurement value.

Note 3 to entry: This definition is similar to that of “data about data”, as defined in ISO 19115, among other International Standards.

3.18

non-destructive investigation

application of a set of procedures or techniques to obtain observations on a material without lastingly changing its physical structure and chemical characteristics

3.19

observation

act of observing a property, with the goal of producing an estimate of the value of the property

Note 1 to entry: This definition is conformant with the definition of *observation* in ISO 19156.

3.20

plot

elementary area where individual observations are made and/or samples are taken

Note 1 to entry: All types of plots only provide locality, but not soil information itself. For example, a borehole is the location where you gather the information to abstract a profile information from.

3.21

profile element

general term for both horizons and layers

3.22

project

unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources

Note 1 to entry: An individual project may form part of a larger project structure.

Note 2 to entry: In some projects, the objective(s) is (are) refined and the product characteristics defined progressively as the project proceeds (see IEC 62198).

Note 3 to entry: The data can be existing or new.

Note 4 to entry: For the purposes of this International Standard, the objective is the collection or interpretation of soil data (see also [3.23](#)).

[SOURCE: ISO 9000:2000, definition 3.4.3 — modified. Notes 2 to 4 are particular to this International Standard.]

3.23

project

<digital exchange of soil-related data>activity that leads to the collection of soil data

3.24

sample

solid, liquid, gaseous or living material extracted from the soil, soil solution, sewage water, interflow water or soil air to be described or analysed

3.25

sampling

process by which a sample is obtained

3.26

site

defined area which is subject to a soil quality investigation

Note 1 to entry: A site provides the area around a plot.

3.27

soil feature types

specific set of feature types specified in this International Standard

3.28

soil body

artificial but recognizable tridimensional entity in a soil continuum

3.29

soil map

two- or three-dimensional representation of soil or its properties for a geographic extent

3.30

soil mapping unit

aggregate of all soil delineations which are identified by a unique symbol, colour, name or other representation on a map

3.31

soil profile

describable representation of the soil that is characterized by a vertical succession of horizons or at least one or several parent material layers

Note 1 to entry: The soil profile is abstracted from observations in a trial pit or a boring.

3.32

subclass

class that inherits attributes, operations, methods, relationships and semantics from another class, with some restrictions or extensions

Note 1 to entry: An instance of subclass can be always considered as an instance of the parent class

3.33

trial pit

test pit

trench

excavation prepared to carry out profile descriptions, sampling, and/or field tests

[SOURCE: ISO 11074.]

3.34

URL

Uniform resource locator

mechanism for identifying resources on the Internet (such as Web pages) by specifying the address of the resource and the access protocol used

[SOURCE: ISO 9241-151:2008.]

3.35

URN

universal resource name

code identifying a service or a resource on the Internet

[SOURCE: ISO 5127:2001.]

3.36

UML

unified modelling language

type of modelling element that extends the semantics of the metamodel

[SOURCE: ISO/IEC 19501.]

3.37

XSD

XML schema definition

extensible schema definition

set of rules to which an XML document shall conform in order to be considered “valid” according to that schema

Note 1 to entry: Where XML is the language, XSD is a specific definition using the XML language.

Note 2 to entry: XSD is sometimes called: “XML schema”.

4 Rationale

4.1 General

This International Standard is specifically made for the exchange of soil quality data. It does not deal with the nevertheless very common use and exchange data from other disciplines, like geotechnics, geo-information, or groundwater investigation and management.

Sometimes, soil data exchange is successful or not determined by the interpretation of the incoming data by the receiving system. Basically, the receiving system can only successfully interpret incoming data when the feature types described by the data and the parameters themselves are known prior to the data exchange.

To get a handle on the problem that a huge number of systems exist for the description of soils with different parameters, parameter names, and parameter value code lists, this International Standard defines a set of features with which soils are described and that is complete, i.e. cannot be extended within the framework of this International Standard.

If soil quality data defined according to this International Standard are combined with other kinds of data, the soil quality part shall be performed, using the XML namespace “ISO 28258”.

Additionally, very few, inherent properties of these features are defined as well. This feature catalogue enables the data receiving system to allocate any data to a known feature class.

The flexibility needed to consider soil-related data of various origins is maintained by not defining any other part of the soil description, i.e. the attributes for any of these features and — if needed — the list of their valid values (code lists). Instead, a structure is provided how to define them and how to relate to these definitions from data exchange files.

When exchanging data, the sender and receiver shall both refer to the same attribute parameters and code lists and interpret them in the same way. When pieces of data are exchanged, a reference should be made to its definition in a definition file; when a coded value is exchanged, a reference shall be made to the relevant code list using URN. For data exchange, a code list can be included completely or not at all. If included, the code list shall be provided as a separate file.

It is recommended that attributes parameters and code lists according to [Clause 5](#) are made publicly available by the producer or publisher of the soil-related data in digital form.

In order to make use of advantages of data modelling with a wider, more generic scope, this International Standard is based on the rules and requirements of ISO 19156 and ISO 19136.

To provide a good reference for soil quality data, all soil quality items of ISO 25177 are worked out as an example soil quality data list in [Annex A](#).

The codes of the soil attributes examples in [Annex A](#) are given in [Annex B](#).

[Clause 5](#) provides the information model for soil quality data exchange used in this International Standard. All soil quality information shall (eventually) refer to a specific place (point, location, mapping unit) in or under the surface of the earth. For all geographical information, the ISO 19100 family of International Standards is used.

All analytical results shall refer to an appropriate standard, if available.

4.2 Requirements worked out

This International Standard requires that soil quality data exchange is based on an information model itself based on ISO 19156. Thus, this International Standard provides a basis for soil quality data exchange, while maintaining flexibility (“extend the model according to your own needs”).

Another way of maintaining flexibility is using parameters that can be added and filled in according to particular needs.

Qualitative values for attributes are usually standardized in lists (“code lists”, “domain tables”). For example, the values for attribute “land use” might be from the list:

- “agriculture”;
- “forest”;
- “snow or ice cover”;
-

ISO 25177 provides several such lists. Again, in different types of investigation different code lists may be used. For example, the code list for soil types may differ among countries. This International Standard does not prescribe which code lists are to be used. However, when qualitative soil data are exchanged, it should be done with reference to a data source where the qualitative value is defined. For example, two parties agree to exchange data on land use using the codes provided in ISO 25177:2008, 4.2. The data exchange should contain at least the value itself (e.g. “18; Snow or ice cover”) and a reference, for example, to “ISO 25177:2008, 4.2 land use”. Preferably, such a reference is given using an URL so that the reference can be found easily by either man or machine.

4.3 Introduction main soil quality data set

ISO 25177 and ISO 15903 provide standards for the description of attributes of soil data. When exchanging soil quality data in a particular context, additional attributes shall be considered that do not occur in ISO 25177 and ISO 15903. Additional attributes may differ in a particular context — for example, a country or a project. In order to make it possible to exchange all types of relevant soil data attributes, this International Standard prescribes only general rules for soil data exchange with a suggestion on how to exchange the most common soil data attributes as listed in ISO 25177 and ISO 15903.

[Clause 5](#) provides the information model for soil quality data exchange used in this International Standard. The model may be extended or modified in specific situations, according to rules provided in this International Standard.

5 Soil features information model

5.1 Principles from observations and measurements

This International Standard inherits principles from ISO 19156, but specializes in features of interest and the description of observations and measurements for soil domain artefacts.

[Figure 2](#) describes the relationship between this International Standard and other International Standards.

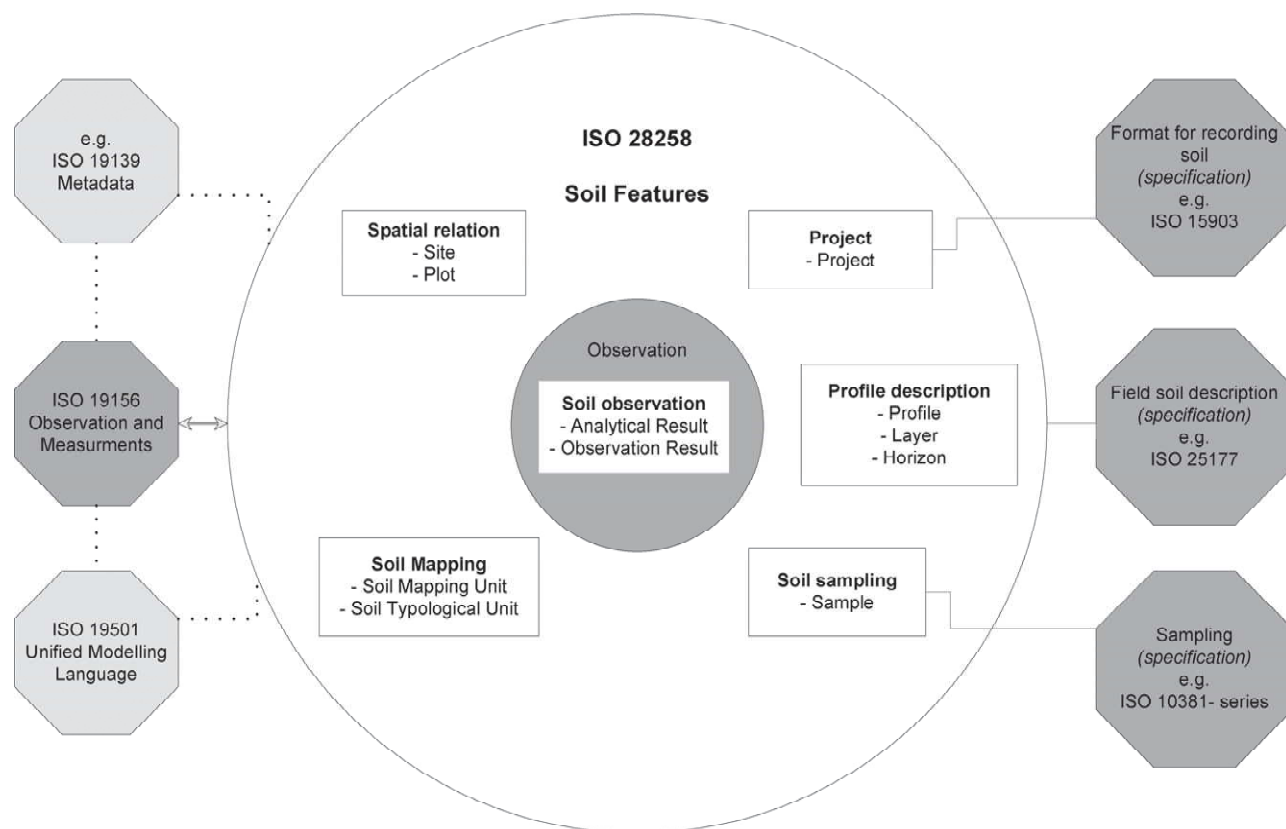


Figure 2 — Inner structure of soil information and its setting within other standards

5.2 General model for soil quality data exchange

5.2.1 General

As stated in [Clause 4](#), soil quality data exchange shall be performed through an information model that is based on observations and measurements according to ISO 19156, which provides a generic way to exchange observations and measurements of any kind. With its general features and links to other International Standards it provides a logical and technical framework. This International Standard is an implementation of ISO 19156 in the field of soil science. Technically speaking, the UML model for soil data exchange is a profile, in accordance with ISO 19106, of ISO 19156. That means it concretizes the more general model of ISO 19156, particularly with the following restrictions.

- The OM_Observation is restricted to *SoilObservation*.
- The OM_Process is restricted to *ObservationProcess*.
- The SF_SamplingFeature is restricted to *SoilSpecimen* (subclass of SF_Specimen) and *Plot* (subclass of SF_SpatialSamplingFeature).
- The SF_Process is restricted to *PreparationProcess*.
- FeatureType of Observation:featureOfInterest is restricted to *Site*, *Plot*, *Profile*, *ProfileElement*, and *SoilSpecimen* including all their subclasses. It means that only properties of these feature types may be observed.
- FeatureType of SF_SamplingFeature: *sampledFeature* is restricted to *Site*, *Plot*, *Profile*, and *ProfileElement* including all their subtypes.
- OM_ObservationContext and SF_SamplingFeatureCollection are not used.