BS ISO 15143-2:2010

BSI Standards Publication

Earth-moving machinery and mobile road construction machinery — Worksite data exchange

Part 2: Data dictionary

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National foreword

This British Standard is the UK implementation of ISO 15143-2:2010.

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INTERNATIONAL STANDARD

ISO 15143-2

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Earth-moving machinery and mobile road construction machinery — Worksite data exchange —

Part 2: Data dictionary

Engins de terrassement et machines mobiles de construction de routes — Échange de données sur le chantier —

Partie 2: Dictionnaire de données

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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.

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 15143-2 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 3, *Machine characteristics, electrical and electronic systems, operation and maintenance*.

ISO 15143 consists of the following parts, under the general title *Earth-moving machinery and mobile road construction machinery — Worksite data exchange*:

— *Part 1: System architecture*

— *Part 2: Data dictionary*

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Introduction

Electronic data exchange on the construction worksite is rapidly becoming a key technology enabling a number of advances in the construction industry. Moving from predominantly manual data collection methods to more automated data collection and communication will improve worksite quality control. Electronic data exchange will further aid in the scheduling of maintenance, the provision of supervisory functions to be conducted remotely from the worksite and the enhancement of the coordination between engineering tasks, construction management and day-to-day operations on the worksite.

The implementation of an electronic data communication system requires an *a-priori* definition and specification of the elements of data to be communicated. Specification of unique data elements for worksite communication involves the use of an application schema to diagrammatically identify the scenario in which each item of data is to be used. After the scenario has been described, data elements are assigned metadata attributes to fully define and describe the individual data element. The list of data elements with attributes are compiled in tabular form in a data dictionary, which forms the subject of this part of ISO 15143.

Generally, the purpose of data dictionaries is recognized to be the following:

a) to improve the ability to share data elements in a particular domain or among different domains;

b) to provide a base for better understanding of the semantic meaning and syntax of data elements;

c) to manage a data resource so as to maintain the correctness and consistency of the resource;

d) to provide a basis for the development of consistent databases and software that use databases.

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Earth-moving machinery and mobile road construction machinery — Worksite data exchange —

Part 2: Data dictionary

1 Scope

This part of ISO 15143 specifies a data dictionary for the exchange of data in worksite data-controlled construction operations as specified in ISO 15143-1. It also applies to worksite data exchange for the purpose of services related to machine use (see ISO 15143-1:2010, Clause 4), and gives definitions of terms used in relation to the data dictionary.

For the purposes of data exchange between different systems, it includes

— identification, definition and specification of common items of data to be exchanged on typical earth-moving construction worksites,

— definition of application schema,

— metadata describing the attributes of each data element, and

— basic normative data elements with their attributes (in tabular format).

NOTE ISO 15143-1:2010, Annex A, describes the means to extend the data element table presented in Annex A of this part of ISO 15143.

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 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 15143-1:2010, *Earth-moving machinery and mobile road construction machinery — Worksite data exchange — Part 1: System architecture*

ISO 19107:2003, *Geographic information — Spatial schema*

ISO/IEC 10646, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

ISO 16754, *Earth-moving machinery — Determination of average ground contact pressure for crawler machines*

ISO/IEC 11179-1:2004, *Information technology — Metadata registries (MDR) — Part 1: Framework*

ISO/IEC 11179-3:2003, *Information technology — Metadata registries (MDR) — Part 3: Registry metamodel and basic attributes*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15143-1 and ISO/IEC 11179-1, and the following apply.

3.1 General

3.1.1
information
⟨information processing⟩ knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning

[ISO/IEC 11179-1]

3.1.2
information system
information processing system, together with associated organizational resources such as human, technical, and financial resources, that provides and distributes information

[ISO 2382-1]

3.1.3
data dictionary
database used for data that refers to the use and structure of other data; that is, a database for the storage of metadata

[ISO/IEC 11179-1]

3.1.4
metadata
data that defines and describes other data

[ISO/IEC 11179-3]

3.1.5
metadata registry
MDR
information system for registering metadata

[ISO/IEC 11179-3]

3.1.6
metamodel
data model that specifies one or more other data models

[ISO/IEC 11179-3]

3.1.7
metamodel construct
unit of notation for modelling

[ISO/IEC 11179-3]

3.1.8
designation
representation of a concept by a sign which denotes it

[ISO 1087-1]

cf. **designation** (3.2.1.2)

NOTE See also **name** (3.2.1.9).

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3.2 Metadata

3.2.1 Data elements

3.2.1.1
administered item
registry item for which administrative information is recorded in an Administration Record

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 ISO/IEC 11179-3:2003, 4.7.2, lists the specifying types of *administered item*.

3.2.1.2
designation
⟨administered item⟩ designation of an administered item within a context

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 ISO/IEC 11179-3 also defines “designation” as defined in 3.1.8 above.

3.2.1.3
classification scheme
descriptive information for an arrangement or division of objects into groups based on characteristics which the objects have in common

[ISO/IEC 11179-3]

3.2.1.4
classification scheme item
CSI
item of content in a classification scheme

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 This may be a node in a taxonomy or ontology, a term in a thesaurus, etc.

3.2.1.5
classification scheme item value
classification scheme name
instance of a classification scheme item (CSI)

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of classification scheme item*.

NOTE 2 See also Table 1, for the instance of the classification scheme item value.

3.2.1.6
data element concept
DEC
concept that can be represented in the form of a data element (DE), described independently of any particular representation

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.1.7
data element concept name
designation item of a data element concept

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3.2.1.8
data element
DE
unit of data for which the definition, identification, representation and permissible values are specified by means of a set of attributes

NOTE Metamodel construct is: *Class*.

3.2.1.9
name
⟨administered item⟩ name by which an administered item is designated within a specific context

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of designation*.

NOTE 2 ISO/IEC 11179-3 also defines “name” as the designation of an object by a linguistic expression.

3.2.1.10
definition
⟨administered item⟩ definition of an administered item within a context

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 ISO/IEC 11179-3 also defines “definition” as the representation of a concept by a descriptive statement which serves to differentiate it from related concepts.

3.2.1.11
definition text
definition
text of the definition

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of definition*.

3.2.1.12
definition source reference
reference to the source from which the definition is taken

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of definition*.

3.2.1.13
data element example
representative illustration of the data element

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.1.14
data element example item
actual illustrative case of the data element

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of data element example*.

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3.2.1.15
data origin
reference to the physical source of the data; the instrument, individual or device that performs the measurement and originates the value of the data element

NOTE Metamodel construct is: *Attribute of source*.

3.2.1.16
origin
⟨administered item⟩ source (document, project, discipline or model) of the administered item

NOTE Metamodel construct is: *Attribute of administration record*.

3.2.1.17
data identifier
item identifier
unique identifier for an administered item within a maintenance agency

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of item identifier*.

3.2.1.18
version
version number
unique version identifier of the administered item

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of item identifier*.

3.2.1.19
administrative status
current status
designation of the status in the administrative process of a maintenance agency for handling registration requests

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of administration record*.

NOTE 2 The values and associated meanings of “administrative status” are determined by each maintenance agency.

3.2.1.20
last change date
date of last change
date the administered item was last changed

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of administration record*.

3.2.1.21
explanatory comment
comment
descriptive comments about the administered item

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of administration record*.

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3.2.1.22
organization
unique framework of authority within which a person or persons act, or are designated to act, towards some purpose

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

EXAMPLE Organization incorporated under law; unincorporated organization or activity providing goods and/or services including partnerships, social or other non-profit organizations or similar bodies in which ownership or control is vested in a group of individuals, sole proprietorships and governmental bodies; groupings of the preceding types of organizations where there is a need to identify these in information interchange. [ISO/IEC 6523-1]

3.2.1.23
organization name
responsible organization
designation for the organization

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of organization*.

NOTE 2 It is the name by which the organization is known to the maintenance agency.

3.2.1.24
value domain name
text string identifying the nomenclature assigned to a specific value domain

NOTE 1 See also **value domain** (3.2.2.5)

3.2.1.25
data element derivation
relationship between a data element which is derived, the rule controlling its derivation, and the data element(s) from which it is derived

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Association class*.

3.2.1.26
derivation rule
logical, mathematical, and/or other operations specifying derivation

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.1.27
input data element for derivation
source data element(s) for a data element derivation

3.2.1.28
language section
part of a terminological entry containing information related to one language

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.1.29
language identifier
information in a terminological entry which indicates the name of a language

NOTE 1 The three-character alphabetic codes and names specified in ISO 639-2 are used, with extensions as required.

NOTE 2 Metamodel construct is: *Attribute of language identification*.

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3.2.2 Value domain

3.2.2.1
representation class
classification of types of representations

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.2.2
representation class name
text string identifying the nomenclature assigned to a specific representation class

NOTE See also Table 2, for the instance of representation class name.

3.2.2.3
conceptual domain
CD
set of valid value meanings

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 The value meanings may be either enumerated or expressed via a description.

3.2.2.4
conceptual domain name
set of permissible concepts

3.2.2.5
value domain
VD
set of permissible values

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Class*.

NOTE 2 The value domain provides representation, but has no implication as to the data element concept (DEC) with which the values may be associated, nor of the values' meaning.

3.2.2.6
value domain name
text string identifying the nomenclature assigned to a specific value domain

NOTE 1 Metamodel construct is: *Class.*

3.2.2.7
datatype name
data type name
designation for the datatype

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of datatype*.

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3.2.2.8
datatype scheme reference
reference identifying the source of the datatype specification

[ISO/IEC 11179-3]

NOTE 1 In ISO/IEC 11179-3, the manner of reference is specified by the maintenance agency.

NOTE 2 Metamodel construct is: *Attribute of datatype*.

3.2.2.9
value domain unit of measure
unit of measure used in a value domain

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of value domain*.

3.2.2.10
unit of measure name
name of a unit of measure

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of unit of measure*.

3.2.2.11
unit of measure precision
data resolution
degree of specificity for a unit of measure

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of unit of measure*.

NOTE 2 It is expressed as a number of decimal places to be used in any associated data element values, and is used as a default if no precision is specified on the data element.

3.2.2.12
value domain maximum character quantity
data length
maximum number of characters to represent the data element value

[ISO/IEC 11179-3]

NOTE 1 Metamodel construct is: *Attribute of value domain*.

NOTE 2 Applicable only to character datatypes.

3.2.2.13
value domain format
format
template for the structure of the presentation of the value(s)

[ISO/IEC 11179-3]

EXAMPLE YYYY-MM-DD for a date.

NOTE Metamodel construct is: *Attribute of value domain*.

3.2.2.14
value
data value

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

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3.2.2.15
value item
code value
representation of a value meaning in a specific value domain — the actual value

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of value*.

3.2.2.16
non-enumerated value domain
value domain that is specified by a description rather than a list of all permissible values

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Class*.

3.2.2.17
non-enumerated value domain description
data upper [lower] limit
description or specification of a rule, reference, or range for a set of all permissible values for the value domain

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of non-enumerated value domain*.

3.2.2.18
value domain administration record
administration record for a value domain

[ISO/IEC 11179-3]

NOTE Metamodel construct is: *Attribute of value domain*.

3.3 Elements (see Annex A for data element concept names and definitions)

3.3.1 Frequency, forces, pressures and related dimensions

3.3.1.1
frequency
number of cycles per second

[ISO 8811]

NOTE The frequency is expressed in hertz (Hz).

3.3.1.2
centrifugal force
product of the eccentric moment and the square of the angular rotating velocity

[ISO 8811]

NOTE The centrifugal force is expressed in newtons (N). It could be permissible to express the value, divided by 1 000, in kilonewtons (kN).

3.3.1.3
eccentric moment
product of the eccentric mass and its radius of eccentricity

[ISO 8811]

NOTE It is expressed in kilogram metres (kg·m).

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3.3.1.4
dynamic linear pressure
sum of axle load force (portion of the operating mass on the corresponding drum multiplied by gravity acceleration) and the centrifugal force of the drum exerted on the ground divided by the drum's rolling width

NOTE It is expressed in newtons per centimetre (N/cm).

3.3.1.5
average ground contact pressure
⟨crawler machines⟩ average ground contact pressure, in kilopascals, determined in accordance with ISO 16754

3.3.1.6
theoretical surface pressure
⟨pneumatic tyres⟩ ratio of the machine load, with or without ballast, and the total contact area, measured on an even, hard surface

[ISO 8811]

NOTE The theoretical surface pressure is expressed in megapascals (MPa) and values can be shown in a diagram as the relation between the theoretical surface pressure and the wheel load (force), tyre inflation pressure and contact area.

3.3.1.7
compaction width
width relating to rolling width of drum(s) of a roller where the roller provides compaction forces to the material(s) beneath it

3.3.1.8
track shoe width
$W4$
distance on Y coordinate between Y planes passing through the extreme lateral points of the same track shoe

[ISO 6746-1]

3.3.1.9
track gauge
$W2$
distance on Y coordinate between two Y planes passing through the middle of the width of the sprocket teeth

[ISO 6746-1]

3.3.2 Machine masses

3.3.2.1
axle load
mass on each axle at the operating mass

[ISO 6016]

3.3.2.2
gross machinery mass
GMM
maximum machine mass as approved by the manufacturer, which combines the operating mass (OM) of the machine with the heaviest combination of equipment and attachments, the heaviest combination of optional equipment, the rated payload (PL), as specified by the manufacturer, the rated ballast mass (BM) and, when applicable, full sprinkler water tank(s)

[ISO 6016]

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3.3.2.3
operating mass
OM
mass of the base machine, with equipment and empty attachments in the most usual configuration as specified by the manufacturer, and with the operator (75 kg), a full fuel tank and all fluid systems (i.e. hydraulic oil, transmission oil, engine oil, engine coolant) at the levels specified by the manufacturer and, when applicable, with sprinkler water tank(s) half-full

NOTE 1 The mass of an operator is not included for non-riding machines.

NOTE 2 Ballast mass included at delivery can be included if specified by the manufacturer.

[ISO 6016]

3.3.2.4
rated payload
PL
paymass
mass that can be carried by the machine, as specified by the manufacturer

[ISO 6016]

3.3.2.5
shipping mass
SM
mass of the base machine without an operator, and with fuel level at 10 % of tank capacity or with the minimum fuel level needed for machine shipping purposes as specified by the manufacturer, whichever is higher, all fluid systems at the levels specified by the manufacturer, and with empty sprinkler tank(s), if required, and with or without equipment, ballast, attachment, cab, canopy, operator-protective structures, wheels and counterweights as stated by the manufacturer

NOTE If the machine has to be disassembled for shipping purposes, the masses of these dismounted components should be stated by the manufacturer.

3.3.3 Machine dimensions

For the specific dimensions for each machine family, see ISO 6747, ISO 7131, ISO 7132, ISO 7133, ISO 7134, ISO 7135, ISO 8811, ISO 8812 and ISO 13539.

3.3.3.1
Ackermann steering angle
$A2$
angle in Z plane described by the front or rear axle of the machine when the wheels are pivoting from the straight-ahead position to the maximum left or right position

[ISO 6746-1]

3.3.3.2
angle of approach
$A3$
angle in Y plane between the GRP and a plane tangent to the forward tyres or tracks and passing through the lowest point of any structure of the base machine forward of the tyres or tracks, which limits the magnitude of the angle

[ISO 6746-1]

3.3.3.3
angle of departure
$A4$
angle in Y plane between the GRP and a plane tangent to the rear tyres or tracks and passing through the lowest point of any structure of the base machine behind the tyres or tracks, which limits the magnitude of the angle

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[ISO 6746-1]

3.3.3.4
articulation angle
*A*1
angle in Z plane described by the front portion of a machine when pivoting from the straight-ahead position to the maximum left or right position

[ISO 6746-1]

3.3.3.5
blade height
distance on Z coordinate between GRP and the top of the blade (excluding name plate and spill guard) with the blade on the ground in mid-pitch position (where applicable) with no blade tilt or angle

[ISO 6746-2]

3.3.3.6
clearance radius
*R*2
distance in Z plane between the turning centre and the farthest point of the machine while it is executing its smallest practicable turn

NOTE For machines with independent steering, *R*2 will be measured from the machine centreline.

[ISO 6746-1]

3.3.3.7
crawler base
*L*2
distance on X coordinate between two X planes passing through the front idler axis and the sprocket (or rear idler) axis

[ISO 6746-1]

3.3.3.8
ground clearance
*H*4
distance on Z coordinate between the GRP and the central part of the machine, minus dimension *H*5

NOTE The central part of the machine is defined as 25 % of the track gauge (*W*2) or tread (wheel type, *W*3) to either side of the zero Y plane.

[ISO 6746-1]

3.3.3.9
ground reference plane
GRP
plane on which the machine is placed for measurements: in the case of the base machine, a hard, level surface; in the case of equipment and attachments, either a hard, level surface or compacted earth

NOTE The surface used depends on the intended use of the machine and its equipment and attachments. This needs to be defined when developing specific ISO terminology standards or commercial specifications.

[ISO 6746-1]

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3.3.3.10
grouser height
*H*5
distance on Z coordinate between two Z planes passing through the face of the shoe and the tip of the grouser

NOTE For a triangular section shoe, it is the distance between two Z planes passing through the track link bolting surface and the tip of the grouser.

[ISO 6746-1]

3.3.3.11
maximum height
*H*1
distance on Z coordinate between the GRP and the highest point of the machine with cab or operator protective structures (e.g. ROPS), including track grousers resting on a hard surface with no penetration

[ISO 6746-1]

3.3.3.12
maximum length
*L*1
distance on X coordinate between two X planes passing through the farthest points on the front and rear of the machine

[ISO 6746-1]

3.3.3.13
maximum width
*W*1
distance on Y coordinate between two Y planes passing through the farthest points of the machine on both sides of the zero Y plane

[ISO 6746-1]

3.3.3.14
rear axle to pivot of articulated steering
*L*5
distance on X coordinate between two X planes passing through the rear axle and pivot centre

[ISO 6746-1]

3.3.3.15
rear overhang
*L*4
⟨crawler machines⟩ distance on X coordinate between two X planes passing through the sprocket or rear idler axis and the rear mounting surface of the machine

[ISO 6746-1]

3.3.3.16
rear overhang
*L*4
⟨wheeled machines⟩ distance on X coordinate between two X planes passing through the rear wheel centre and the rearmost feature

[ISO 6746-1]

3.3.3.17
seat index point
SIP

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