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Indian Standard

IS/ISO 6165 : 2012
(Reaffirmed 2017)

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Earth–Moving Machinery — Basic Types — Identification and Terms and Definitions

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Material Handling Systems and Equipment Sectional Committee, MED 07

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 6165 : 2012 ‘Earth-moving machinery — Basic types — Identification and terms and definitions’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Material Handling Systems and Equipment Sectional Committee and approval of the Mechanical Engineering Division Council.

The Indian Standard supersedes IS/ISO 6165 : 2006 ‘Earth-moving machinery — Basic types —Identification and terms and definitions'.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

The technical committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 10261	Earth-moving machinery — Product identification numbering system

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

EARTH–MOVING MACHINERY — BASIC TYPES — IDENTIFICATION AND TERMS AND DEFINITIONS

1 Scope

This International Standard gives terms and definitions and an identification structure for classifying earth-moving machinery designed to perform the following operations:

— excavation;

— loading;

— transportation;

— drilling, spreading, compacting or trenching of earth, rock and other materials, during work, for example, on roads and dams, in quarries and mines and on building sites.

The purpose of this International Standard is to provide a clear means of identifying machines according to their function and design configurations.

Annex A provides a procedure based on the identification structure used by this International Standard for classifying the machinery and for introducing detailed identifications consistent with the logic implied by the structure.

Annex B provides a hierarchy of the operator control configurations for earth-moving machinery.

The Bibliography provides a list of terminology standards for many of the machine families identified in this International Standard. Included in those terminology standards are figures depicting different configurations of the machine types in each machine family.

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 10261, *Earth-moving machinery — Product identification numbering system*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
earth-moving machinery
self-propelled or towed machine on wheels, crawlers or legs, having *equipment* (3.9) or *attachment* (3.10) (working tool), or both, primarily designed to perform excavation, loading, transportation, drilling, spreading, compacting or trenching of earth, rock and other materials

Note to entry: Earth-moving machinery can be of a type either directly controlled by an operator riding or not riding on the machine, or can be remotely controlled by wired or wireless means with or without direct view on the working area. See Annex B for types of operator control configurations.

3.1.1
compact machine
earth-moving machinery (3.1), except for *compact excavators* (4.4.4) and *compact loaders* (4.2.3), having an *operating mass* (3.7) of 4 500 kg or less

3.2
direct-control machine
self-propelled *earth-moving machinery* (3.1) where the machine is controlled by an operator in physical contact with the machine

3.2.1
ride-on machine
self-propelled *direct-control machine* (3.2) where the control devices are located on the machine and the machine is controlled by a seated or standing operator

3.2.2
non-riding machine
self-propelled *direct-control machine* (3.2) where the control devices are located on the machine and the machine is controlled by a pedestrian operator (neither seated nor standing on the machine)

3.3
remote-control machine
self-propelled *earth-moving machinery* (3.1) where the machine is controlled by the transmission of signals from a control box (transmitter) that is not located on the machine to a receiving unit (receiver) located on the machine

Note to entry: The remote control can either be wireless or by wire.

3.3.1
wire-controlled machine
self-propelled *remote-control machine* (3.3) where the control of the machine is accomplished by signals transmitted through wires from an operator-controlled device distant from the machine

Note to entry: Normally, a wire-controlled machine is operated with a direct view on the working area.

3.3.2
wireless-controlled machine
self-propelled *remote-control machine* (3.3) where the control of the machine is accomplished by signals transmitted through the air from an operator-controlled device distant from the machine

Note to entry: A wireless-controlled machine is operated with or without a direct view on the working area.

3.4
machine family
group of machines designed for the same type of operation

Note to entry: *Earth-moving machinery* (3.1) comprises the following machine families:

— *dozers* (4.1);

— *loaders* (4.2);

— *backhoe loaders* (4.3);

— *excavators* (4.4);

— *trenchers* (4.5);

— *dumpers* (4.6);

— *scrapers* (4.7);

— *graders* (4.8);

— *landfill compactors* (4.9);

— *rollers* (4.10);

— *pipelayers* (4.11);

— *horizontal directional drills* (4.12);

— *compact tool carriers* (4.13).

3.5
machine model
machine type
manufacturer's designation of a *machine family* (3.4)

Note to entry: A machine family can have several models or types which are the manufacturer's type designation of the machine.

3.6
individual machine
machine having a unique identification number for each manufactured machine

Note to entry: The product identification number (PIN) according to ISO 10261 clearly identifies the individual machine.

3.7
operating mass
mass of the *base machine* (3.8), with *equipment* (3.9) and empty *attachment* (3.10) in the most usual configuration as specified by the manufacturer, and with the operator (75 kg), 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

[SOURCE: ISO 6016:2008, 3.2.1.]

Note 1 to entry: The mass of the operator is not included for non-riding machines.

Note 2 to entry: Ballast mass at delivery can be included if specified by the manufacturer.

3.8
base machine
machine with a cab or canopy and operator-protective structures if required, without *equipment* (3.9) or *attachments* (3.10) but possessing the necessary mounting for such equipment and attachments

[SOURCE: ISO 6746-2:2003, 3.3.]

3.9
equipment
set of components mounted onto the *base machine* (3.8) that allows an *attachment* (3.10) to perform the primary design function of the machine

[SOURCE: ISO 6746-2:2003, 3.4.]

3.10
attachment
assembly of components that can be mounted onto the *base machine* (3.8) or *equipment* (3.9) for specific use

[SOURCE: ISO 6746-2:2003, 3.5.]

3.11 Derivative machines

3.11.1
derivative earth-moving machinery
earth-moving machinery (3.1) that is a combination of features from other earth-moving *machine families* (3.4), creating a different configuration or arrangement

EXAMPLE Machine having the front-mounted equipment of a loader and a non-self-loading, rear-mounted dumper body.

3.11.2
derivative support machinery used on earth-moving worksites
machinery derived from an earth-moving *machine family* (3.4), creating a different configuration or arrangement with a different intended use, primarily intended to be operated on earth-moving worksites or other building sites

EXAMPLE Articulated-frame dumper with the dumper body removed and replaced by a water tank for wetting of haul roads or by a fuel tank/lubrication body.

Note to entry: Such support machines are typically used to perform jobsite or machine maintenance tasks.

4 Machine families

4.1
dozer
self-propelled crawler or wheeled machine with *equipment* (3.9) having either a dozing *attachment* (3.10) which cuts, moves and grades material through forward motion of the machine or a mounted attachment used to exert a push or a pull force

4.2
loader
self-propelled crawler or wheeled machine having front-mounted *equipment* (3.9), primarily designed for loading operation (bucket use), which loads or excavates through forward motion of the machine

Note to entry: A loader work cycle normally comprises filling and elevating, and the transporting and discharging of material.

4.2.1
swing loader
loader (4.2) having a swing-type lift arm which can rotate to the left and the right of the straight position

Note to entry: A swing-loader work cycle is similar to a loader cycle, but additional work can be done with the *equipment* (3.9) offset from the longitudinal axis of the machine.

4.2.2
skid steer loader
loader (4.2) normally having an operator station between or to the side of the attachment-supporting structure(s) and steered by using variation of speed, and/or direction of rotation between traction drives on the opposite sides of a machine having fixed axles on wheels or tracks

4.2.3
compact loader
loader (4.2) having an *operating mass* (3.7) of 4 500 kg or less for wheeled loaders and 6 000 kg or less for crawler loaders, designed to work in areas with limited space, with the associated need for greater manoeuvrability

4.3
backhoe loader
self-propelled crawler or wheeled machine having a main frame designed to carry both front-mounted *equipment* (3.9) and rear-mounted backhoe equipment (normally with outriggers or stabilizers)

Note 1 to entry: When used in the backhoe mode, the machine is stationary and normally digs below ground level.

Note 2 to entry: When used in the loader mode (bucket use), the machine loads through forward motion.

Note 3 to entry: A backhoe work cycle normally comprises excavating, elevating, swinging and the discharging of material. A loader work cycle normally comprises filling, elevating, transporting and discharging of material.

4.4
excavator
self-propelled machine on crawlers, wheels or legs, having an upper structure capable of a 360° swing with mounted *equipment* (3.9) and which is primarily designed for excavating with a bucket, without movement of the undercarriage during the work cycle

Note 1 to entry: An excavator work cycle normally comprises excavating, elevating, swinging and the discharging of material.

Note 2 to entry: An excavator can also be used for object or material handling/transportation.

Note 3 to entry: Unless specifically identified as a cable excavator (4.4.3), an excavator is also commonly referred to as a hydraulic excavator.

4.4.1
minimal swing radius excavator
MSRX
excavator (4.4) designed for operation in a confined space, having an upper structure with a short swinging radius and with its *equipment* (3.9) and *attachment* (3.10) swinging within 120 % of the width of the undercarriage

4.4.2
walking excavator
excavator (4.4) with three or more supporting legs, which can be articulated, telescopic or both, and which can be fitted with wheels

4.4.3
cable excavator
excavator (4.4) having a wire-rope-operated upper structure designed primarily for excavation with a dragline bucket, front shovel or grab, used for compacting material with a compaction plate, for demolition work by hook or ball, and for material handling with special *equipment* (3.9) and *attachments* (3.10)

4.4.4
compact excavator
excavator (4.4) having an *operating mass* (3.7) of 6 000 kg or less

4.5
trencher
self-propelled crawler or wheeled machine, having rear- and/or front-mounted *equipment* (3.9) or *attachment* (3.10), primarily designed to produce a trench in a continuous operation, through motion of the machine

Note to entry: The attachment can be a digging chain, wheel, disk, plough blade or similar.

4.6
dumper
self-propelled or towed crawler or wheeled machine with an open body, which transports and dumps or spreads material, and where loading is performed by means external to the dumper

Note to entry: A compact dumper can have integral self-loading equipment.

4.6.1
rigid-frame dumper
dumper (4.6) having a rigid frame and wheel or crawler steering

4.6.2
articulated-frame dumper
dumper (4.6) with an articulated frame which accomplishes the steering of the machine

4.6.3
swing dumper
dumper (4.6) having a 360° swing upper structure, whose upper structure consists of a rigid frame, the open body and the operator's station, and whose undercarriage consists of a track type or wheeled unit

4.6.4
towed dumper
towed wagon
dumper (4.6) that is not self-propelled but which is propelled instead by a towing machine on which the operator's station is located

Note to entry: The towed dumper can function in different ways (e.g. side-dump, bottom-dump, rear-dump or use an ejector).

4.7
scraper
self-propelled or towed crawler or wheeled machine which has a bowl with a cutting edge positioned between the axles, and which cuts, loads, transports, discharges and spreads material through its forward motion

Note to entry: The loading through a forward motion can be assisted by a powered mechanism (elevator) fixed to the scraper bowl.

4.7.1
towed scraper
scraper (4.7) that is not self-propelled but which is propelled instead by a towing machine on which the operator's station is located

4.8
grader
self-propelled wheeled machine with an adjustable blade positioned between the front and rear axles, which can be equipped with a front-mounted blade or scarifier that can also be located between the front and rear axles

Note to entry: The machine is primarily designed for grading, sloping, ditching and the scarifying of materials through its forward motion.

4.9
landfill compactor
self-propelled wheeled compaction machine having front-mounted *equipment* (3.9) with a dozing or loading *attachment* (3.10) and wheels provided with means to crush and compact waste material, which also moves, grades and loads soil, landfill or sanitary (refuse) materials through its motion

4.10
roller
self-propelled or towed machine having a compaction device, consisting of one or more metallic cylindrical bodies (drums) or rubber tyres, which compacts material such as crushed rock, earth, asphalt or gravel through a rolling and/or vibrating action of the compaction device

4.10.1
towed roller
roller (4.10) that is not self-propelled but which is propelled instead by a towing machine on which the operator's station is located

4.11
pipelayer
self-propelled crawler or wheeled machine having pipe-laying equipment with main frame, load-hoist mechanism, vertically pivotable boom and counterweight, primarily designed to handle and lay pipes

4.11.1
side-boom pipelayer
pipelayer (4.11) with the vertically pivotable boom mounted to the side of the machine so that it only moves in a vertical direction

4.11.2
rotating pipelayer
pipelayer (4.11) with rotating upper structure to which the vertically pivoting boom is attached so that the boom can also move with the rotation of the upper structure

4.12
horizontal directional drill
machine that uses a steerable cutting head attached to the end of a drill string for creating a bore through the earth in a horizontal direction

Note 1 to entry: Drilling can include fluid injection through the drill string to the cutting head, tracking of the bore by use of sensors or a transponder near the cutting head and subsequent enlargement of the bore by backreaming.

Note 2 to entry: These machines typically apply force to the drill string using a drill frame parallel to, or inclined up to, 30° relative to the operating earth surface.

4.13
compact tool carrier
self-propelled crawler or wheeled machine having an *operating mass* (3.7) of less than 1 500 kg with a rigid frame, having either a pedestrian operating position or a standing operator platform at the rear of the machine and either front-mounted interchangeable *equipment* (3.9) or lift arms with an attachment bracket capable of coupling to interchangeable, front-mounted *attachments* (3.10)

Annex A
(informative)

Identification procedure

This annex provides information on the identification structure used by this International Standard, as well as a procedure for using the structure to classify machinery and introduce detailed identification consistent with the logic implied.

Machines are identified according to their

a) machine family (see Clause 4),

b) operating mass (3.7), and

c) operator control configuration (see Annex B).

The machine family structure is based on the chart shown in Figure A.1.

The machine's operating mass is used to identify possible mass limits in some machine configurations (e.g. compact machines).

Operator control configuration is related to the way in which the machine is controlled, and to the posture of the operator and location of the operator's station (see Annex B).

In general, earth-moving machinery can be broadly identified by combining specifications from each of the characteristics mentioned above. This allows the unique identification of machines not explicitly referenced in this International Standard, provided that they belong to one of the existing machine families.

EXAMPLE 1 Compact rigid-frame dumper with seated operator.

Other characteristics can be added to provide additional clarification.

EXAMPLE 2 Tracked compact rigid-frame dumper with seated operator.

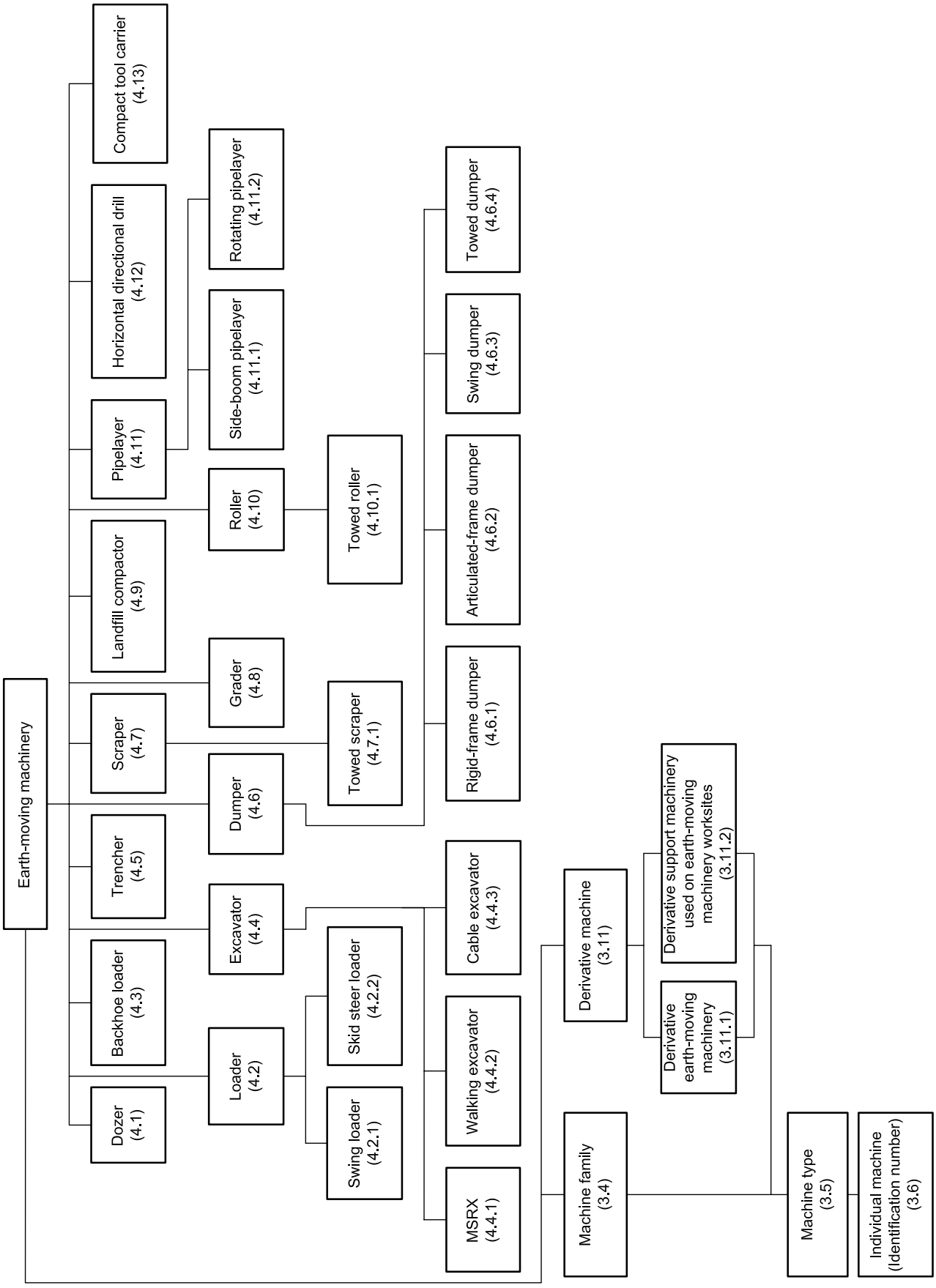

Figure A.1 — Machine identification chart

Annex B
(informative)

Earth-moving machinery operator control configurations

The operator control configurations of earth-moving machinery can be arranged in a hierarchical structure according to the control type, operating classification and operator posture, as shown in Figure B.1.

NOTE 1 The structure shown in Figure B.1 does not preclude the possibility of introducing new configurations according to advances in technology.

NOTE 2 Machines with autonomous and semi-autonomous control types are intended to be covered in a future International Standard.

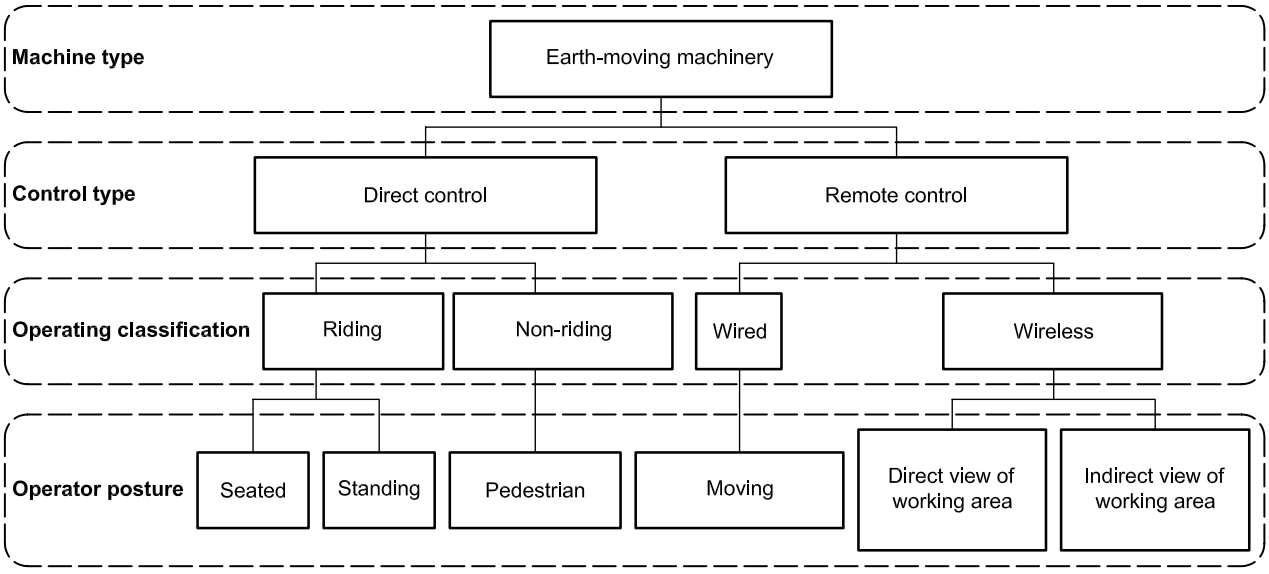

Figure B.1 — Earth-moving machinery operator control configurations

Bibliography

Reference terminology standards:

[1] ISO 6747, *Earth-moving machinery — Tractor-dozers — Terminology and commercial specifications*

[2] ISO 7131, *Earth-moving machinery — Loaders — Terminology and commercial specifications*

[3] ISO 7132, *Earth-moving machinery — Dumpers — Terminology and commercial specifications*

[4] ISO 7133, *Earth-moving machinery — Tractor-scrapers — Terminology and commercial specifications*

[5] ISO 7134, *Earth-moving machinery — Graders — Terminology and commercial specifications*

[6] ISO 7135, *Earth-moving machinery — Hydraulic excavators— Terminology and commercial specifications*

[7] ISO 7136, *Earth-moving machinery — Pipelayers— Definitions and commercial specifications*

[8] ISO 8811, *Earth-moving machinery — Rollers and compactors— Terminology and commercial specifications*

[9] ISO 8812, *Earth-moving machinery — Backhoe loaders — Definitions and commercial specifications*

[10] ISO 13539, *Earth-moving machinery — Trenchers — Definitions and commercial specifications*

[11] ISO 15219, *Earth-moving machinery — Cable excavators — Terminology and commercial specifications*

[12] ISO 21467, *Earth-moving machinery — Horizontal directional drills — Terminology and specifications*

Related standards:

[13] ISO 6016, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

[14] ISO 6746-2, *Earth-moving machinery — Definitions of dimensions and codes — Part 2: Equipment and attachments*

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Amendments Issued Since Publication

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