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Building construction machinery and equipment — Concrete mixers —

Part 1: Commercial specifications

Machines et matériels pour la construction des bâtiments — Malaxeurs à béton —
Partie 1: Spécifications commerciales

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Foreword

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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 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 195, *Building construction machinery and equipment*, Subcommittee SC 1, *Machinery and equipment for concrete work*.

This second edition cancels and replaces the first edition (ISO 18650-1:2004), which has been technically revised.

The main changes compared to the previous edition are as follows:

— added definition for "self-loading mobile concrete mixer" in 3.1.3.4 and also added reference to Figures A.23 and A.24;

— added commercial specifications for discharging-chute concrete mixer in 5.3.4 and self-loading mobile concrete mixer in 5.3.8;

— added Figures A.17 to A.22 for clarification of classification.

A list of all parts in the ISO 18650 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Building construction machinery and equipment — Concrete mixers —

Part 1: Commercial specifications

1 Scope

This document establishes the content for commercial literature for concrete mixers used either as individual machines on building sites or as components of batching plants.

Definitions refer to whole machines, their structure and parameters.

The commercial specifications establish technical characteristics of the whole machines and their components.

Truck mixers, as defined in ISO 19711-1, are excluded from this document.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
concrete mixer
machine designed for the production of concrete by mixing of measured (by mass or volume) proportions of water, cement, aggregate and possibly chemical additives, within a certain time limit

Note 1 to entry: A concrete mixer can be furnished with the following accessories: charging skip hoist, fixed or wheeled, or self-propelled supporting frame, mechanical shovel, water dosing equipment, and a skip weighing system.

3.1.1
batch-type concrete mixer
concrete mixer (3.1) in which charging with concrete constituents and discharging of the drum are carried out periodically, in batches

3.1.2
continuous-type concrete mixer
concrete mixer (3.1) in which charging with concrete constituents and discharging of the drum are carried out continuously as an uninterrupted flow

Note 1 to entry: See Figures A.15 and A.16 for examples.

3.1.3
gravity concrete mixer
free-fall concrete mixer
concrete mixer (3.1) where mixing is performed by repeatedly elevating the mixed concrete and dropping it from a certain height, inside a mixing drum, during its rotation

3.1.3.1
reversing-drum concrete mixer
reversing concrete mixer
gravity concrete mixer (3.1.3) with a reversible direction of rotation of the mixing drum where discharge of mixed concrete is by reversing the rotation of the drum

Note 1 to entry: See Figures A.4 and A.5 for examples.

3.1.3.2
tipping-drum concrete mixer
free-fall concrete mixer (3.1.3) with a tipping mixing drum, open at one end for charging and discharging of the concrete mix where discharging is carried out by tilting the drum

Note 1 to entry: See Figures A.1, A.2 and A.3 for examples.

3.1.3.3
discharging-chute concrete mixer
free-fall concrete mixer (3.1.3) with a mixing drum open at both sides where charging is carried out from one side and discharging from the other by means of a chute entering the drum

Note 1 to entry: See Figure A.17 for an example.

3.1.3.4
self-loading mobile concrete mixer
gravity concrete mixer (3.1.3) with a reversible direction of rotation of the mixing drum where discharge of mixed concrete is by reversing the rotation of the drum, integrated into a self-propelled frame equipped with a self-loading attachment intended to use for a complete production and batching of concrete, including transportation on road and off-road to reach the pouring site

Note 1 to entry: See Figures A.23 and A.24 for examples.

3.1.4
compulsory concrete mixer
concrete mixer (3.1) with mixing effected by the action of one or more agitators moving inside a mixing chamber with either a vertical axis (pan) or horizontal axis (trough)

Note 1 to entry: See Figure A.18 for an example.

3.1.4.1
pan-type concrete mixer
compulsory concrete mixer (3.1.4) with agitators rotating about the vertical axis of a stationary or rotating pan

3.1.4.2
turbo concrete mixer
compulsory concrete mixer (3.1.4) with an agitator rotating about the vertical axis of a stationary pan, charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figures A.6, A.7 and A.8 for examples.

3.1.4.3
planetary concrete mixer
compulsory concrete mixer (3.1.4) with vertically mounted agitators having a planetary type of motion, inside a stationary pan where the mixer is charged from the top, and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figures A.9 and A.10 for examples.

3.1.4.4
turbo planetary concrete mixer
compulsory concrete mixer (3.1.4) having one agitator rotating about the vertical axis of a stationary pan in addition to other agitators in planetary motion where the mixer is charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figure A.19 for an example.

3.1.4.5
counter-current operation concrete mixer
compulsory concrete mixer (3.1.4)with one or more agitators rotating about the vertical axes in a counter-rotating pan where the mixer is charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figure A.20 for an example.

3.1.4.6
concurrent operation concrete mixer
compulsory concrete mixer (3.1.4) with one or more agitators rotating about vertical axes in a pan rotating concurrently where the mixer is charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figure A.21 for example.

3.1.4.7
concrete mixer with high-speed stirrer
concrete mixer with high-speed activator
compulsory concrete mixer (3.1.4) with one or more agitators rotating about vertical axes including one high speed agitator (activator) where the mixer is charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: See Figure A.22 for an example.

3.1.4.8
paddle concrete mixer
compulsory concrete mixer (3.1.4) with one or two paddle agitators rotating about horizontal axis in a casing (trough) where the mixer is charged from the top and discharged by opening a segment of the pan bottom

Note 1 to entry: The paddles may be straight or helix edged.

Note 2 to entry: See Figures A.11, A.12, A.13 and A.14 for examples.

3.2
charging time
t_1
duration, expressed in seconds, of charging the concrete components to the *batch-type concrete mixer* (3.1.1) for one batch

3.3
mixing time
t_2
<batch-type concrete mixer> duration, expressed in seconds, from the completion of charging the concrete components in a *batch-type concrete mixer* (3.1.1) to the completion of their mixing

3.4
mixing time
t_2
<continuous-type concrete mixer> duration, expressed in seconds, during which the concrete components in a *continuous-type concrete mixer* (3.1.2) are kept in the mixing chamber

Note 1 to entry: The mixing time for a continuous-type concrete mixer is calculated as follows:

$$t_2 = \frac{m_c}{q_m}$$

where

m_c is the mass of concrete components in the mixing chamber, expressed in kilograms;

q_m is the mass flow rate of the concrete components being charged, expressed in kilograms per second.

3.5
discharging time
t_3
duration, expressed in seconds, from the start of discharging to its completion

Note 1 to entry: The remainder in the mixer after discharging is expected to not to exceed 3 % of *ready concrete capacity* (3.10).

3.6
reset time
t_4
duration, expressed in seconds, from the completion of the discharging to the start of charging for the next batch

3.7
cycle time
t_c
duration, expressed in seconds, from the start of charging concrete components to the completion of preparation to accept the next charge after the reset

Note 1 to entry: The cycle time is calculated as follows:

$$t_c = t_1 + t_2 + t_3 + t_4$$

3.8
number of batches
n
quantity of batches of mixing in a one-hour period of time

Note 1 to entry: The number of batches per hour is calculated as follows:

$$n = 3\,600 / t_c$$

where t_c is the *cycle time* (3.7), expressed in seconds.

3.9
dry components capacity
V_c
volume, expressed in cubic metres, of dry components (cement + aggregates) for one batch

3.10
ready concrete capacity
V_u
volume, expressed in cubic meters, of ready concrete received from one batch

Note 1 to entry: The approximate volume of ready concrete received from one batch can be calculated as follows:

$$V_u = V_c \cdot \alpha$$

where

V_c is the *dry components capacity* (3.9), expressed in cubic metres;

α is the coefficient equal to the ratio V_u / V_c , which, for ordinary concrete [as defined in Note 1 to entry for *rated capacity* (3.11)], is 0,7.

3.11
rated capacity
parameter equal to the *dry components capacity* (3.9), V_c, divided by the *ready concrete capacity* (3.10), V_u

Note 1 to entry: Typically, concrete mixer rated capacity refers to the ordinary concrete used in building sites which has a density between 1 800 kg/m^3 and 2 500 kg/m^3 and is composed of cement, water, fine and coarse mineral aggregates and possibly mineral additives and chemical admixtures. In the case of special concrete mixes (e.g. heavy aggregates), it is necessary that the concrete mixer capacity value be agreed between the supplier and purchaser.

EXAMPLE If the dry-components capacity for a mixer is 0,5 m^3 and the ready concrete capacity is 0,35 m^3, then the rated capacity is 350/500.

3.12
theoretical output capacity
Q
number of cubic metres of ready concrete received from the mixer per hour of operation expressed in cubic meters per hour

Note 1 to entry: The theoretical output for a batch type concrete mixer is calculated as follows:

$$Q = n \times V_u$$

where

n is the *number of batches* (3.8) per hour;

V_u is the *ready concrete capacity* (3.10), expressed in cubic metres.

Note 2 to entry: The theoretical output capacity for a continuous mixer is calculated as follows:

$$Q = \frac{3\,600 \times q_m}{\rho}$$

where

q_m is the mass flow rate of charging concrete components, expressed in kilograms per second;

ρ is the specific gravity of the produced concrete components, expressed in kilograms per cubic metre.

4 Description of the basic structures of concrete mixers

4.1 Basic structure of gravity concrete mixers

4.1.1 General

Gravity concrete mixers (see Figures A.1 to A.5) consist of the following basic units: an electric motor or combustion engine, a mixing drum, a mixing drum transmission, and a tipping drum mechanism and supporting frame, which may be provided with wheels to aid relocation. The larger machines (with a capacity larger than approximately 0,35 m^3) typically have a skip hoist or charging bucket, a water-dosing unit and a towbar (see Figures A.3, A.4 and A.5).

4.1.2 Basic structure of self-loading mobile concrete mixer

Self-loading mobile concrete mixer consists of the following basic units: a self-propelled chassis, a mixing drum and a self-loading attachment (see Figures A.23 and A.24).

4.2 Basic structure of compulsory concrete mixers

Compulsory concrete mixers (see Figures A.6 to A.14) consist of the following basic units: a pan or trough, mixing blades, an electric motor and transmission for the mixing-blades drive, a discharging gate and its drive. Larger machines (with a capacity larger than approximately 0,35 m^3) are typically equipped with a charging skip hoist, a cover for the pan or trough and a water-distributing installation (see Figures A.7, A.8, A.10 and A.14). For easy relocation, the machines may be provided with wheels.

5 Commercial specifications

5.1 Basic characteristics of a concrete mixer

5.1.1 General data

Specify the following parameters in the designated units, where given:

a) general type, e.g. tipping drum, reversing drum, discharging chute, pan, turbo, planetary, turbo-planetary, counter-current operation, concurrent operation, with high-speed stirrer and paddle concrete mixer;

b) rated capacity, in m^3;

- dry components capacity, in m^3;
- ready concrete capacity, in m^3;
- theoretical output capacity, in m^3;

c) output per hour for a specified number of cycles, n, in m^3/h;

- charging time, in s;
- mixing time, in s;
- discharging time, in s;

— reset time, in s;

— cycle time, in s;

— number of batches, in h^{-1};

This parameter designates the technical capability of a mixer and usually refers to ordinary concrete (as defined in Note 1 to entry 3.11) production. Some concrete mixes (e.g. with a low water/cement ratio used in the precast-concrete industry) may require a prolonged mixing time. In these cases, it is necessary that the mixer's output capacity be agreed between the purchaser and supplier.

d) maximum size of aggregates:

— gravel, in mm;

— crushed stone, in mm;

e) total power installed, in kW;

f) mass of the base machine, in kg;

g) mass of the unloaded machine in operating mode, in kg;

h) overall dimensions during operation:

— length, in mm;

— width, in mm;

— height, in mm.

5.1.2 Detailed data for the concrete mixer components

5.1.2.1 Motors and engines for mixing mechanisms

Specify whether the unit is driven by an electric motor or a combustion engine, and the relevant information from the following:

a) electric motors:

— number of phases;

— supply voltage, in V;

— power, in kW;

— frequency, in Hz;

— revolutions, in min^{-1};

b) combustion engines:

— type:

— 4-stroke gasoline;

— 2-stroke gasoline;

— diesel;

— power, in kW;

— revolutions, in min^{-1}.

5.1.2.2 Skip hoist or bucket with optional specifications

Specify the following:

a) skip-hoist or bucket capacity, in m^3;

b) speed of lifting and descending, in m/min;

c) time of lifting and descending (for charging bucket), in s;

d) mass of the skip hoist or bucket assembly, in kg.

5.1.2.3 Hydraulic or pneumatic installation for tilt mechanism

Specify the following:

a) capacity of the hydraulic pump or compressor, in l/min;

b) maximum pressure (gauge), in MPa;

c) volume of the hydraulic oil tank or air tank, in l.

5.1.2.4 Water dosing installation with optional specifications

Specify the following:

a) water-supply pressure, in MPa;

b) water-pump capacity, in l/min;

c) nominal diameter of water supply line, in mm;

d) type of water-supply unit:

   — flow type with flow meter;

   — volume type with water tank;

   — weighing type with scale;

e) operating capacity of water-supply unit, in l.

5.2 Dimensional characteristics of concrete mixers

The following dimensions and characteristics of concrete mixers, required for their installation and operation, shall be provided:

a) overall dimensions (length, width and height) in operating mode and prepared for relocation (the latter pertains to a mixer provided with wheels);

b) maximum angle of inclination of the mixing drum in operation (pertains to tipping-drum concrete mixers);

c) dimensions and location of charging and discharging holes, including the slewing angle for the discharging gate;

d) dimensions of the skip hoist or charging bucket assembly;

   — width and length of the skip-hoist track;

   — overall dimensions of the ship hoist and bucket;

e) location of the charging skip hoist relative to the drum or pan;