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Building construction machinery and equipment — Concrete mixers —

Part 1: Vocabulary and general specifications

Machines et matériels pour la construction des bâtiments — Malaxeurs de béton —

Partie 1: Vocabulaire et spécifications générales

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Foreword

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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 18650-1 was prepared by Technical Committee ISO/TC 195, *Building construction machinery and equipment*.

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ISO 18650 consists of the following parts, under the general title *Building construction machinery and equipment — Concrete mixers*:

— *Part 1: Vocabulary and general specifications*

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A Part 2 dealing with the procedures for examination of the mixing efficiency is in preparation.

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Introduction

This International Standard deals with concrete mixers used either as individual machines on building sites or as components of batching plants.

The document provides the terms, definitions and commercial specifications for the subject machines.

The definitions refer to whole machines, their structures and parameters.

The commercial specifications establish technical characteristics of the whole machines and their components. Enclosed figures explain structures and dimensions characteristic of the concrete mixers.

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Building construction machinery and equipment — Concrete mixers —

Part 1: Vocabulary and general specifications

1 Scope

This International Standard establishes additional terms and definitions to describe the functioning and the required and optional components for various types of concrete mixers. The content of commercial literature specifications for these types of machines is defined.

It applies to concrete mixers as defined in ISO 11375, truck mixers excluded.

2 Normative references

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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.

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ISO 11375:1998, *Building construction machinery and equipment — Terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11375 and the following apply.

3.1
pan-type concrete mixer
compulsory mixer with agitators rotating about the vertical axis of a stationary or rotating pan

3.2
charging time
t_1
duration of charging the concrete components to the mixer for one batch

NOTE 1 Refers to batch-type concrete mixers.

NOTE 2 The charging time, t_1, is expressed in units of seconds.

3.3
mixing time
t_2
⟨batch-type mixer⟩ duration from the completion of charging the concrete components to the completion of their mixing

NOTE The mixing time, t_2, is expressed in units of seconds.

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3.4
mixing time
t_2
⟨continuous mixer⟩ duration during which the concrete components are kept in the mixing chamber

NOTE 1 The mixing time for a continuous 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.

NOTE 2 The mixing time, t_2, is expressed in units of seconds.

3.5
discharging time
t_3
duration from the start of discharging to its completion

NOTE 1 The remainder in the mixer after discharging is expected not exceed 3 %.

NOTE 2 The discharging time, t_3, is expressed in units of seconds.

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

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NOTE The reset time, t_4, is expressed in units of seconds.

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

NOTE 1 The cycle time is calculated from the following equation: $t_c = t_1 + t_2 + t_3 + t_4$.

NOTE 2 The cycle time, t_c, is expressed in units of seconds.

3.8
number of batches
n
quantity of batches of mixing per one hour

NOTE The number of batches per hour is calculated as follows:

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

where t_c is the cycle time, expressed in seconds.

3.9
dry-components capacity
V_c
volume of dry components (cement + aggregates) for one batch

NOTE The dry-components capacity, V_c, is expressed in units of cubic decimetres.

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3.10
ready-concrete capacity
V_u
volume of ready concrete received from one batch

NOTE 1 The approximate volume of ready concrete received from one batch may be calculated from the following equation:

$$V_u = V_c \cdot \alpha$$

where

V_u is the volume of ready concrete, expressed in cubic decimetres;

V_c is the volume of dry components, expressed in cubic decimetres;

α is the coefficient equal to the ratio V_u/V_c, which, for ordinary concrete (as defined in the note in 3.11) is 0,7.

NOTE 2 The ready-concrete capacity, V_u, is expressed in units of cubic decimetres.

3.11
rated capacity
parameter equal to the dry components capacity, V_c, divided by the ready concrete capacity, V_u

NOTE Typically, concrete mixer rating capacity refers to the ordinary concrete used in building sites which has a density between 1,8 kg/dm^3 and 2,5 kg/dm^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.

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

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

NOTE 1 The theoretical output for a batch type concrete mixer is expressed by the equation:

$$Q = n \times V_u/1\,000$$

where

n is the number of batches per hour;

V_u is the capacity of ready concrete, expressed in cubic decimetres.

NOTE 2 The theoretical output capacity for a continuous mixer is calculated as follows:

$$Q = \frac{3,6 \times q_m}{\rho}$$

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 decimetre.

NOTE 3 The theoretical output capacity, Q, is expressed in units of cubic metres per hour.

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4 Description of the basic structures of concrete mixers

4.1 Basic structure of gravity mixers

Gravity 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 bigger machines (with a capacity larger than approximately 350 dm^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).

4.2 Basic structure of compulsory mixers

Compulsory 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. Bigger machines (with a capacity larger than approximately 350 dm^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

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

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

b) rated capacity — dm^3

c) output per hour for a specified number of cycles, n[1)] — m^3/h

d) maximum size of aggregates:

- gravel — mm
- crushed stone — mm

e) total power installed — kW

f) mass of the base machine — kg

g) mass of the unloaded machine in operating mode — kg

h) overall dimensions during operation:

- length — mm
- width — mm
- height — mm

1) This parameter designates the technical capability of a mixer and usually refers to ordinary concrete (as defined in the note to 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.

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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 — V
- power — kW
- frequency — Hz
- revolutions — min^{-1}

b) combustion engines:

- type:
  - i) 4-stroke petrol
  - ii) 2-stroke petrol
  - iii) diesel
- power — kW
- revolutions — min^{-1}

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5.1.2.2 Skip hoist or bucket with optional specifications

Specify the following:

a) skip-hoist or bucket capacity — dm^3

b) speed of lifting and descending — m/min

c) time of lifting and descending (for charging bucket) — s

d) mass of the skip hoist or bucket assembly — kg

5.1.2.3 Hydraulic or pneumatic installation for tilt mechanism

Specify the following:

a) capacity of the hydraulic pump or compressor — l/min

b) maximum pressure (gauge) — MPa

c) volume of the hydraulic oil tank or air tank — dm^3

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5.1.2.4 Water dosing installation with optional specifications

Specify the following:

a) water-supply pressure — MPa

b) water-pump capacity — l/min

c) internal diameter of water supply line — 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 — l

5.2 Dimensions characteristic of concrete mixers

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

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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);

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

f) dimensions of the pan and its cover (diameter, height);

g) spacing of mounting holes (pertains to stationary mixers).

Examples of characteristic dimensions of concrete mixers are presented in Figures A.1 to A.6 and A.8 to A.14.

5.3 Other specifications for particular types of concrete mixers

NOTE These characteristics augment the data given in 5.1.

5.3.1 Tipping drum gravity concrete mixer

See Figures A.1, A.2 and A.3.

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