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Building construction machinery and equipment — Concrete pumps —

Part 1: Commercial specifications

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Foreword

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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 third edition cancels and replaces the second edition (ISO 21573-1:2014), which has been technically revised.

The main changes are as follows:

- in Clause 3:
  - the definition for “maximum theoretical pumping output” has been updated;
  - the definitions for the following terms have been added:
    - maximum delivery pressure;
    - outrigger span;
- in Table 1, the new classification “drive system” with the following sub-items has been added:
  - fuel engine driven;
  - electric power driven;
  - hybrid power driven;
- in Table 1, the new type “crawler” with sub-item "crawler pump" has been added in the “Mode or frequency of transportation” row;
- in Table 1, the new classification “Type of piston-type concrete pump valve system” with the following sub-items has been added:
  - Swing valve;

  - Gate valve;
- in Clause 5, the following subclauses have been updated to match the content in ISO 21573-2:
  - general characteristics (5.1);
  - dimensional characteristics (5.4);
  - distributing boom (5.6);
  - outrigger components (5.7);
- in Annex A, Figure A.15 has been added.

A list of all parts in the ISO 21573 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.

Introduction

This document deals with concrete pumps used on building sites for concrete-mix delivery. It defines technical characteristics of the relevant machines. Annex A provides examples of current structures of concrete pumps and their principles of operation.

Building construction machinery and equipment — Concrete pumps —

Part 1: Commercial specifications

1 Scope

This document establishes the content for commercial specifications for concrete pumps which are used on building sites for concrete-mix delivery.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 11375:1998, *Building construction machinery and equipment — Terms and definitions*

ISO 21573-2:2020, *Building construction machinery and equipment — Concrete pumps — Part 2: Procedure for examination of technical parameters*

3 Terms and definitions

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

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

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

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

3.1
piston-type concrete pump
pump in which a piston is used to impart energy to the concrete mix, with the intent of transporting the mix to and through the conveying pipe and/or hose

Note 1 to entry: See Figure A.1.

3.2
rotary-type concrete pump
pump in which a peristaltic action is used to impart energy to the concrete mix with the intent of transporting the mix to and through the conveying pipe and/or hose

Note 1 to entry: See Figures A.6, A.7, A.8 and A.9.

3.3
stationary-type concrete pump
skid, rail or wheeled-chassis mounted concrete pump intended for long-term operation on one building site

Note 1 to entry: See Figure A.13.

3.4
piston-type concrete pump valve system
system composed of cut-off valves successively locking and opening concrete mix flow from the hopper to the concrete cylinder and from the latter to the conveying pipe

Note 1 to entry: See Figures A.2, A.3, A.4 and A.5.

Note 2 to entry: The operation of the valves is synchronized so that, when the concrete-mix flow from the hopper to the concrete cylinder is opened, the flow to the conveying pipe is closed. Various types of valve systems are identified.

3.5
distributing boom
folded boom with fixed concrete mix conveying pipe the role of which is to deliver concrete mix to work areas within its reach

Note 1 to entry: See Figures A.10 and A.14.

Note 2 to entry: The boom has the possibility of folding in the vertical plane and slewing around the vertical axis. Typically, a rubber hose is fixed to the end of the conveying pipe to facilitate concrete-mix distribution.

3.6
maximum applicable size of aggregate
largest size of aggregate that can be consistently delivered through the concrete pump without blockage, including any conveying pipe that is normally supplied on the finished product

3.7
minimum applicable slump
minimum value of slump applicable for conveying by concrete pump

3.8
maximum theoretical pumping output
maximum theoretical volume of concrete per hour calculated based on the designed values of the delivery mechanism of the concrete pump

3.9
maximum delivery pressure
maximum pressure in the delivery line system including the case of blockage in the delivery line system

3.10
outrigger span
actual distance between adjacent centrelines of vertical cylinders with outriggers fully extended or projection distance of the actual distance on the reference plane

Note 1 to entry: The outrigger span shall be measured in accordance with ISO 21573-2:2020, Clause 10.

4 Classification of the concrete pumps

In general, concrete pumps are classified by the following five main characteristics (see Table 1):

— type of pumping unit;

— type of piston-type concrete pump valve system;

— mode or frequency of transportation;

— form of conveying;

— concrete mix delivery with assistance;

— drive system.

Table 1 — Classification of the concrete pumps

Classification	Type	Current examples	Reference figures
Type of pumping unit	Piston	Hydraulic driven	Figure A.1
		Mechanical driven	—
		Single-piston	—
		Multi-piston	Figure A.1
	Rotary	Vacuum	Figure A.6, A.7
		Elastic	Figure A.8, A.9
Type of piston-type concrete pump valve system	Swing valve	S-type	Figure A.1
		C-type	Figure A.4
		Skirt-type	Figure A.5
	Gate valve	Structure and principle of operation of the gate valve system (horizontal type)	Figure A.2
		Structure and principle of operation of the gate-valve system (vertical type)	Figure A.3
Mode or frequency of transportation	Self-propelled mobile	Truck-mounted	Figures A.10, A.11, A.14 and ISO 11375:1998, Figure 41
	Non self-propelled mobile	Trailer-mounted (with tires on highway)	Figure A.12 and ISO 11375:1998, Figure 42
		Trailer-mounted, steel wheels (rides on rails)	—
		Trailer-mounted, track	—
	Stationary	Skid-mounted/Fixed in place	Figure A.13
		Trailer mounted (with tires off-road)	ISO 11375:1998, Figure 42
	Crawler	Crawler pump	Figure A.15
Form of conveying	With integral distributing boom	Truck mounted	Figure A.10, A.14 and ISO 11375:1998, Figure 41
		Trailer-mounted	ISO 11375:1998, Figure 43
	With separate distributing boom	Tower-mounted boom	ISO 11375:1998, Figure 44
		Articulating distribution arm (with support legs)	—
	With connected conveying line	Pipe and/or hose run from pump to placement	—
Concrete-mix delivery with assistance	With pressurized air	Concrete spraying	—

Table 1 *(continued)*

Classification	Type	Current examples	Reference figures
Drive system	Fuel engine driven	Stationary type (skid mounted/fixed in place)	Figure A.13
		Trailer mounted (with tires off-road)	ISO 11375:1998, Figure 42
		Trailer mounted (with tires on highway)	Figure A.12
		Truck mounted	Figure A.10, A.14 and ISO 11375:1998, Figure 41
	Electric power driven	Stationary type (skid mounted/fixed in place)	Figure A.13
		Trailer mounted (with tires off-road)	ISO 11375:1998, Figure 42
		Trailer mounted (with tires on highway)	Figure A.12
		Truck mounted	Figure A.10, A.14 and ISO 11375:1998, Figure 41
	Hybrid power driven	Truck mounted	Figure A.10, A.14 and ISO 11375:1998, Figure 41

5 Commercial specifications

5.1 General characteristics

The following characteristics shall be specified:

— model and type;

— manufacturer's name;

— maximum theoretical pumping output (m^3/h);

— maximum delivery pressure (MPa);

— diameter of concrete pumping cylinder (mm);

— stroke length of concrete pumping cylinder (mm);

— number of strokes per minute;

— outlet diameter of concrete valve device (mm);

— capacity of hopper (m^3);

— drive system:

  — fuel engine (kW, torque, water/air cooled, RPM, etc.);

  — electric power (kW, torque, RPM, voltage, current, etc.);

  — hybrid power [kW (combined engine and electric motor), torque (combined engine and electric motor), RPM, voltage, current, etc.];

— acceptable leaning angle of the machine during pumping operation (degrees);

— operating mass (kg);

specify the mass of the concrete pump under the following conditions:

- fully operational and all systems functional;
- with or without cab (to be stated);
- including all standard equipment following the manufacturers' specifications;
- with a driver of mass 75 kg;
- with fuel tank full;
- with cleaning water, cooling, lubrication and hydraulic systems full;

— equipment mass (kg): actual mass of the base machine with equipment specified by the manufacturer.

The manufacturer shall provide means for correlating the machine's theoretical maximum concrete line pressure to the theoretical pumping distance capability.

5.2 Applicable concrete

Specify the following:

— maximum applicable size of aggregate (mm);

— minimum applicable slump (cm).

5.3 Drive

Specify the type of the concrete pump's drive:

— by the vehicle engine/electric power/hybrid power and additional gear box for driving the hydraulic system.

— by a separate diesel engine/electric power/hybrid power for driving the hydraulic system.

5.4 Dimensional characteristics

Specify the following:

— overall dimensions:
  - length, L (mm);
  - width, W (mm);
  - height, H (mm);

— wheel base, L_1 (mm);

— feeding height of hopper H_1 (mm);

— maximum reach in vertical (m);

— maximum reach in horizontal (m).

For the maximum reach of the distributing boom, see Figure A.14.