

INTERNATIONAL
STANDARD

ISO
19711-2

First edition
2023-10

**Building construction machinery and
equipment — Truck mixers —**

Part 2:
Safety requirements

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Reference number
ISO 19711-2:2023(E)

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Published in Switzerland

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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.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 19711 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 is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

Building construction machinery and equipment — Truck mixers —

Part 2: Safety requirements

1 Scope

This document specifies the safety requirements for truck mixers defined in ISO 19711-1.

This document does not deal with carrier vehicles, e.g. trucks, tractors, construction machinery and mobile industrial handling equipment or other self-propelled vehicles.

This document does not include requirements which are covered in directives related to the construction of vehicles or national road regulations.

NOTE The use in public road traffic is governed by the national regulations.

This document deals with all significant hazards, hazardous situations and events relevant to truck mixers when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see [Annex D](#)). This document specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards during transportation, assembly, dismantling, disabling, scrapping, operation and maintenance of the truck mixer.

Figures to show examples in this document are listed in [Annex A](#).

This document is not applicable to truck mixers manufactured before the date of its publication.

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 19711-1, *Building construction machinery and equipment — Truck mixers — Part 1: Terminology and commercial specifications*

IEC 60204-1:2016, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity standard for industrial environments*

ISO 2867, *Earth-moving machinery — Access systems*

ISO 3457, *Earth-moving machinery — Guards — Definitions and requirements*

ISO 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13766-1, *Earth-moving and building construction machinery — Electromagnetic compatibility (EMC) of machines with internal electrical power supply — Part 1: General EMC requirements under typical electromagnetic environmental conditions*

ISO 13766-2, *Earth-moving and building construction machinery — Electromagnetic compatibility (EMC) of machines with internal electrical power supply — Part 2: Additional EMC requirements for functional safety*

ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13850, *Safety of machinery — Emergency stop function — Principles for design*

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14120, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19711-1, ISO 12100 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 drum opening

opening for charging and discharging the drum

3.2 control station

unit with control devices for operating the functions of the truck mixer

Note 1 to entry: The control station can be a remote-control station with cable or cable-less.

Note 2 to entry: See [Figure A.1](#).

Note 3 to entry: Functions of the truck mixer include, e.g. rotation direction of drum, rotating speed, stop function of the drum, working light switch, power chute switch.

3.3 work station

place where the main control station of the drum drive is arranged, that is usually located near the discharge chute

Note 1 to entry: The work station is for operating the charging, mixing and discharging. The operator ([3.8](#)) is either standing on ground level (see [Figure A.1](#)) or in case of rear discharge type truck mixer, it can be on the tread at the rear underrun protective device. Additional control stations can be provided, e.g. in the cabin of the truck.

3.4**drum closure system**

device to cover the *drum opening* (3.1) partly or completely to prevent spilling of mixture

Note 1 to entry: The drum closure system is optional.

3.5**supporting arm**

superstructure for carrying the charge device and discharge device and the working platform

3.6**rear splash guard**

device below the drum preventing the drum from getting dirty

Note 1 to entry: The rear splash guard is provided on the rear discharge type truck mixer.

Note 2 to entry: See [Figure A.15](#).

3.7**interface**

connections that allow the transfer of physical forces, energies, commands and/or information (e.g. mechanical, hydraulic, pneumatic, electrical, electronical) between the mixer device and the truck or trailer on which it is mounted

3.8**operator**

person authorised and trained to operate a truck mixer

Note 1 to entry: In general, the mixer operator is also the driver of the truck mixer.

3.9**normal operation**

operation of the machine with all systems in function

3.10**emergency operation**

operation of the machine with a system failure

EXAMPLE In case of energy source(s) or control system failure, a separate hydraulic power pack is connected; and the mixer device is operated by manual valve actuation under circumvention of the emergency-stop system.

3.11**visual aid**

system that provides visual information without warning

Note 1 to entry: The system generally includes a monitor and camera.

3.12**visibility test rectangle****VTR**

rectangle located on the plane ground as reference, aligned symmetrically to the longitudinal axis of the truck mixer in order to test the *visual aid* (3.11)

Note 1 to entry: See [Figure A.16](#).

3.13**truck mixer drum cleaning system**

separate machine to remove residual mixture from the inside of the drum

4 Safety requirements and/or protective measures

4.1 General requirements

4.1.1 General

Machinery shall conform to the safety requirements and/or protective measures of this clause.

In addition, the machine shall be designed in accordance with the principles of ISO 12100 for hazards that are relevant, but not significant, and which are not dealt with by this document (e.g. sharp edges).

4.1.2 Mechanical hazards

4.1.2.1 Risk of slipping

The surface of means of access, e.g. steps, working platform, shall be slip-resistant. See ISO 2867:2011, Annex A, for examples of slip-resistant surfaces.

4.1.2.2 Risk of entanglement, crushing, shearing

To protect the operator from the risk of entanglement, crushing and shearing, fixed guards shall be provided in accordance with ISO 14120. Due to functional restrictions, the following exceptions to ISO 13857:2019, Table 3 and Table 4, shall apply.

For the empty truck mixer standing on level ground, [Table 1](#) provides the minimum clearances between the drum and non-moving parts, with the hazard zone situated at a distance W from an imaginary vertical plane parallel to the longitudinal axis of the vehicle intersecting the most outer point of the vehicle (reference plane).

Table 1 — Minimum clearance a depending on the distance W to the reference plane

W	Minimum clearance, a
≥ 800 mm	≥ 20 mm
< 800 mm	≥ 50 mm

NOTE See [Figure A.3](#).

Besides the general minimum clearances of [Table 1](#), further exceptions are provided in [Table 2](#).

Table 2 — Clearances for specific entanglement points

	Entanglement points	Clearance
1	drum roller cover - drum track ring	max. 10 mm (Figure A.6)
2	drum - supporting arm	min. 20 mm (Figure A.7)
3	drum - charge device bracket	min. 20 mm (Figure A.8)
4	drum - discharge hopper	min. 20 mm (Figure A.9)
5	drum - guard rail at working platform	min. 50 mm (Figure A.10)
6	drum closure system - discharge hopper	min. 20 mm (Figure A.11)
7	drum - extension chute	min. 20 mm (Figure A.12)
8	drum - extension chute with bracket	min. 20 mm (Figure A.13)
9	drum - concrete delivery pipe	min. 20 mm (Figure A.14)

Table 2 (continued)

	Entanglement points	Clearance
10	drum - rear splash guard	min. 20 mm (Figure A.15)

The hazard zones shall be indicated by decals; and the residual risk shall be described (see 6.3.2).

4.1.2.3 Risk of impact, risk of injection

The hydraulic system shall be designed in accordance with ISO 4413.

The pneumatic system shall be designed in accordance with ISO 4414.

NOTE The hydraulic system and the pneumatic system of the truck or trailer are not covered.

The interface specified by the truck or trailer manufacturer shall be used.

4.1.3 Electrical hazards

Electrical installations shall conform to IEC 60204-1.

The interface specified by the truck or trailer manufacturer shall be used.

4.1.4 Thermal hazards

Parts or surfaces that reach temperatures $>75\text{ }^{\circ}\text{C}$ under normal operating conditions shall be designed, constructed, positioned, or provided with a thermal guard to minimize the risk of contact from the workstation in accordance with ISO 3457.

For ergonomic data that can be used to establish temperature limit values for hot surfaces, see ISO 13732-1.

4.1.5 Noise

4.1.5.1 Noise reduction at the design stage

Machinery shall be designed and constructed in such a way that risks resulting from the emission of airborne noise are reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source.

When designing machinery, the available information and the technical measures to reduce noise at the source given in ISO/TR 11688-1 should be taken in to account.

NOTE ISO/TR 11688-2 gives useful information on noise-generation mechanisms in machinery.

Noise sources mainly include the power source(s), drum drive and the drum with its content. The power source on the truck is the main source of noise.

In case the truck is purchased by the truck mixer manufacturer, the truck mixer manufacturer is recommended to ask for a low-noise truck.

Noise reduction is possible, e.g. with the choice of low-noise hydraulic components, gears, auxiliary engine if any, reduction of vibration transmitted from drive to other parts of construction and design of the construction that prevents the arising of resonance.

NOTE See also Annex B.

4.1.5.2 Information on noise emission

Information on noise emission shall be given in the information for use (see 6.3.2).

4.1.6 Electromagnetic compatibility (EMC)

Truck mixers with combustion engine shall conform to the requirements of electromagnetic compatibility as specified in ISO 13766-1 and ISO 13766-2.

Electric grid-connected truck mixers shall conform to IEC 61000-6-2.

Any other drive design or combination of drive designs shall conform to the applicable standards.

4.2 Control system

4.2.1 Stop system

4.2.1.1 Emergency stop

The machine shall have an emergency stop at each control station (see also [4.2.3](#)). The emergency stop shall conform to ISO 13850 and shall stop all power-driven machine functions.

NOTE According to the state of the art, the energy source(s), for example, the engine of the truck, auxiliary motor, can stay in operation.

Stop category 0 in accordance with IEC 60204-1:2016, 9.2.2, shall be fulfilled.

The emergency-stop system shall fulfil performance level c in accordance with ISO 13849-1.

4.2.1.2 Normal stop

A normal stop device shall be provided to bring the machine to a complete stop. In case of a combustion engine, the ignition lock (key- and keyless-systems) shall be considered as a normal stop device. In case of an electric drive, an additional supply disconnecting device in accordance with IEC 60204-1:2016, 5.3 and 9.2.5.3, shall be provided. Stop category 0 in accordance with IEC 60204-1:2016, 9.2.2, shall be fulfilled.

4.2.1.3 Starting of the machinery

An intended control device for starting the operation of the machinery shall be provided.

4.2.1.4 Restarting of the machinery

When restarting the machinery after a stoppage, an unexpected start-up of hazardous functions of the machine shall be prevented. To prevent the unexpected start-up of the truck mixer, the safety-related part of the control system shall fulfil performance level c in accordance with ISO 13849-1.

4.2.1.5 Devices for switching off for prevention of unexpected start-up

Means to isolate machinery from energy sources shall be provided and shall be capable to be locked. For a truck mixer, the ignition key of the truck or the ignition key of the auxiliary engine are considered to fulfil the requirement.

4.2.2 Multiple control stations

If there is more than one control station at the machine, the respective function shall only be possible from one control station at the same time in accordance with IEC 60204-1: 2016, 9.2.7.4.

The safety-related part of the control system shall fulfil performance level c in accordance with ISO 13849-1.

NOTE A mechanical control system where multiple levers are connected to activate the same function at the same time does not fulfil the requirements of [4.2.2](#).

4.2.3 Cable-less remote control

A cable-less remote control is considered a control station. All requirements for control systems equally apply for cable-less remote controls, except for the emergency stop.

A cable-less remote control shall be equipped with a stop function in accordance with IEC 60204-1:2016, 9.2.7.3. The safety-related part of the stop system shall fulfil performance level c in accordance with ISO 13849-1. In case of the presence of a cable-less remote control, the machine shall be equipped with at least one emergency stop at the rear (see [4.2.1.2](#)).

4.3 Manual control devices for emergency operation

Manual control devices for emergency operation, for example, to discharge the drum, shall be protected against unintended use, for example, by a fixed guard, a distance guard or the structure of the machinery acting as a guard. The use of these manual control devices shall be described [see [6.2.3.1 b](#)].

4.4 Positioning of control devices

4.4.1 Control devices at the work station

The control devices at the work station close to drum opening shall be positioned in a distance from the ground between 800 mm and 1 800 mm.

4.4.2 Other control devices

Handling positions of other control devices and equipment used on the construction site shall be positioned in a maximum height from the ground or from the tread on the rear underrun protective device in accordance with [Table 3](#).

Table 3 — Maximum height of other control devices

Frame height	Maximum height of other control devices
Up to 1 000 mm	1 800 mm
Higher than 1 000 mm up to 1 100 mm	1 900 mm
Higher than 1 100 mm	2 000 mm

4.5 Working lights

For the illumination of the work station, at least one working light shall be provided with a minimum light power of 800 lm.

4.6 Additional removable equipment

Additional, removable equipment (e.g. extension chutes) and tools to be handled manually by the operator shall have a maximum mass of 25 kg each. Means shall be provided for the operator to fix such equipment and to secure it against unintended movement.

4.7 Interface mixer device and truck or trailer

The interface between the mixer device and the truck or trailer shall be designed and constructed in accordance with the specifications defined by the truck or trailer manufacturer.

4.8 Drum

4.8.1 Drum access hole

At least one drum access hole shall be provided. The size of a drum access hole shall have a minimum clear diameter of 500 mm except in the following cases. The mass of a drum access hole cover shall not exceed 25 kg (see ISO 2867:2011, 5.11).

For a drum of a smaller size with a rated drum capacity up to 6 m³, it shall have a minimum diameter of 420 mm. For a drum of a larger size with a rated drum capacity 6 m³ and over, a minimum diameter of 500 mm shall apply.

If the rectangular or oval shape is used for the opening, the larger opening dimension shall be at a minimum 500 mm; and the smaller opening dimension shall be at a minimum 400 mm.

4.8.2 Drum-locking device

To prevent unintended rotation of the drum while the operator is working in the drum, the truck mixer shall be equipped with a drum-locking device; alternatively, it may be purchased from the mixer manufacturer as required under the following condition b).

It shall fulfil the following requirements.

- a) The drum-locking device shall withstand a turning moment of the drum of 25 000 Nm or a force which is created from 1 m³ of cured concrete within the drum.
- b) The drum-locking device shall be permanently mechanically connected/linked to the machine near the locking point. If work inside the drum is only allowed at a service shop, the drum-locking device shall be stored where maintenance and repair work of the drum is to be conducted.
- c) If intended to be handled manually (hand-held) by the operator, the weight of each single piece of the drum-locking device shall not exceed 10 kg.
- d) The drum-locking device shall be designed to work throughout the whole lifetime of the truck mixer.
- e) If a friction-based locking device is provided, it shall be designed taking into consideration that the machine can be exposed to friction-reducing agents.

For ergonomic positioning during works inside the drum, a minimum of two locking positions shall be provided to avoid overhead works (e.g. removal of hardened concrete or replacement of drum fins).

When the drum is locked by the drum-locking device, the drum access hole shall be located at an angle of approximately 60° compared to the vertical plane (see [Figure A.4](#)) so that the drum can be entered from the left and the right side of the truck.

4.8.3 Drum opening

4.8.3.1 Fixed guard at drum opening

The following access to the shearing points shall be prevented by a fixed guard:

- a) drum opening to discharge hopper;
- b) drum opening to charge device.

This fixed guard shall secure the area between the charge device, the drum and the discharge hopper on the side of the working platform up to the vertical plane through the middle axis of the drum.

In addition, this fixed guard shall be shaped and located in a way that the distance between the rear end of this fixed guard and the rear end of the drum is greater than 350 mm. The distance from the rear end of the drum to the front end of this fixed guard shall be at least 120 mm (see also [Figure A.5](#)).

This applies to rear discharge type truck mixer. For front discharge type truck mixer, “rear end of the guard” and “rear end of drum” should read as “front end”, also “front end of guard” should be read as “rear end” to be opposite for each.

This fixed guard shall be in accordance with [4.1.2.2](#). The dimension of the openings of this fixed guard shall be in accordance with [Table 2](#). As an exception, for cleaning purposes, e shall be a value of ≤ 60 mm with at the same time a distance of $s_r \geq 120$ mm to the hazard zone (rear end of drum) (see also [Figure A.5](#)).

A warning sign indicating the remaining risks of crushing/shearing shall be applied close to or on this fixed guard (see [6.3.2](#)).

4.8.3.2 Use of truck mixer drum cleaning system

For truck mixers without drum closure systems, the charge device and, where relevant, the surrounding structure shall be designed to be lifted or removed in order to allow access for a truck mixer drum cleaning system.

4.9 Flip-over chute

The flip-over chute is operated manually. Therefore, it shall be equipped with at least one handle to flip over the chute (see [Figure A.17](#)).

The flip-over chute shall be designed in a way that two-hand operation is enforced before reaching the lowered end-position in order to reduce the risk of crushing (see [Figures A.18](#), [A.19](#) and [A.20](#)).

4.10 Swivel chute

Swivel chutes can be operated manually or power-driven. In case of power-driven swivel chutes, the safety-related part of the control system shall be operated with hold-to-run devices which shall fulfil performance level c in accordance with ISO 13849-1.

Appropriate means to fix the swivel chute in a travel position shall be provided.

4.11 Drum closure system

For power-driven drum closure systems, the crushing/shearing point shall be protected by a distance in accordance with [4.1.2.2](#); alternatively, the control device shall be hold-to-run and the safety-related parts of the control system shall fulfil performance level c in accordance with ISO 13849-1.

4.12 Power transmission from the power source to the drum drive system

Entanglement points of power-driven parts shall be covered by fixed guards in accordance with [4.1.2.2](#). For the transmission shaft between the truck engine and the hydraulic pump, this requirement applies to the top and both sides of the shaft.

4.13 Water system

If the truck mixer is equipped with a water system, cleaning equipment (e.g. hose, nozzle) shall be provided at the work station and at the working platform.

NOTE If cleaning is not necessary at the working platform (e.g. external cleaning system), it can be provided at the work station only.

4.14 Exhaust system of the auxiliary engine

Exhaust-gas outlets shall be arranged in such a way that during operation the gases are not directed to the work station area.

4.15 Working platform at the charge device

A working platform to be accessed via a ladder in vicinity to the device shall be provided, conforming to the requirements of ISO 2867. A working platform is not required if routine tasks in this area can be performed remotely, or if other means of access is provided.

Further, the following apply.

- a) The minimum dimensions of the working platform shall be 400 mm × 600 mm.
- b) The ladder beams may be considered as handrails.
- c) The maximum distance between the first step of the ladder and the ground shall be 500 mm.

In addition to the requirements for guard rails in accordance with ISO 2867, the guard rail of the working platform shall be designed in order to prevent operators from standing on an intermediate level (height) between the foot barrier and the handrail (an example is shown in [Figure A.2](#)). This applies to the guard rail on the left, right and rear side of the working platform in driving direction (as shown in [Figure A.2](#)).

A self-closing barrier shall be provided. The barrier shall have at least a handrail positioned at the same level as that of the guard-rail that it extends to.

The barrier shall be designed to open onto the working platform and to close against a firm stop to prevent operators from pushing against it and falling through the opening. Barriers shall be subject to the same loading criteria as guard-rails. The maximum opening left by the closed barrier shall not exceed 120 mm.

NOTE The working platform is not considered as a work station.

4.16 Tread at rear underrun protective device of the rear discharge type truck mixer

The crossbar of the rear underrun protective device shall be equipped with a tread. In case it cannot be equipped on the crossbar due to design reason, a separate tread shall be provided on the other place (e.g. behind the crossbar). In addition, a step is not necessary for a small truck mixer, therefore this subclause does not apply. By exception to ISO 2867, the minimum size of the tread shall be 400 mm × 160 mm. The longer side of the tread shall be parallel to the longitudinal axis of the crossbar.

Its surface shall be designed to be slip-resistant and shall be horizontal when the rear underrun protective device is in its driving position. The upper edge of the tread shall be at the same height or at a maximum 10 mm lower than the upper edge of the crossbar of the rear underrun protective device.

The ladder and/or the structure of the machine may be considered as handrail/handles.

In relation to the longitudinal axis of the truck mixer, the tread shall be positioned at the same side as the work station. In relation to the longitudinal axis of the crossbar, it shall be directed towards the work station.

If the rear underrun protective device is of a flip-over type, appropriate means to fix it in the flip-over position shall be provided.

4.17 Visual aid

A visual aid shall be provided as additional means of hazard detection when moving or repositioning the machine (e.g. mirror, camera/radar and monitor).

The visual aid shall survey the rear section and shall be activated when engaging the reverse gear of the truck or additionally by manual action. The visual aid shall cover the area of the VTR.

The minimum dimensions of the VTR are width $c = 3\,500$ mm and length $a = 5\,000$ mm. The VTR starts at the rear underrun protective device in its driving position (see [Figure A.16](#)).

The test object, a cube with an edge length of 200 mm, shall be completely visible in the VTR, with the exception of the masked area due to the discharge components and the rear underrun protective device.

5 Verification of safety requirements and/or protective measures

Safety requirements and/or measures of [Clause 4](#) shall be verified as specified in [Table 4](#).

The following methods of verification are considered in [Table 4](#):

- a) visual check: verification, by visual inspection, of the integrity of the machine, system or component (e.g. guards, visual warning devices and labels, plates) and documents and drawings provided in accordance with this document;
- b) functional test: verification, by means of a no-load test, that, under no-load operating conditions, the normal cycle, or part of the cycle, the machine with all of its safety devices functions as required and all functions fulfil the requirements of this document and technical documentation;
- c) measurement/calculation: verification that the measurable parameters established conform to the requirements of this document (e.g. geometric dimensioning, safety distances, insulation resistance of electric circuits, noise, vibration).

Table 4 — Verification of the safety requirements

Subclause in Clause 4	Safety requirement and/or protective measure	Method of verification			
		Visual check	Functional test	Measure- ment	Calcu- la-tion
4.1.2.1	Requirements to avoid slipping	X			
4.1.2.2	Requirements to avoid entanglement, crushing, shearing	X		X	
4.1.2.3	Requirements to avoid impact, risk of injection	X		X	
4.1.3	Electrical installation	X	X	X	X
4.1.4	Thermal guarding	X		X	
4.1.5	Noise			X	
4.1.6	Electromagnetic compatibility			X	
4.2.1.1	Normal stop, supply disconnecting device	X	X		
4.2.1.2	Emergency-stop device	X	X		X
4.2.1.3	Requirements to avoid unexpected start- up of the machinery	X	X		X
4.2.1.4	Devices for switching off for prevention of unexpected start-up	X	X		
4.2.2	Requirements for multiple control sta- tions	X	X		X
4.2.3	Cable-less remote control	X	X		
4.3	Manual control devices for emergency operation	X	X		X
4.4	Positioning of control devices	X		X	X

Table 4 (continued)

Subclause in Clause 4	Safety requirement and/or protective measure	Method of verification			
		Visual check	Functional test	Measurement	Calculation
4.5	Working lights	X	X	X	
4.6	Requirements for additional, removable equipment	X	X	X	
4.7	Requirements for interface between mixer and truck or trailer				X
4.8.1	Requirements for drum access hole			X	
4.8.2	Requirements for drum-locking device		X	X	X
4.8.3.1	Requirements for fixed guard at drum opening	X		X	
4.8.3.2	Requirements to enable the use of truck mixer drum cleaning system	X			
4.9	Requirements for flip-over chute	X	X		
4.10	Requirements for swivel chute	X			X
4.11	Requirements for drum closure system	X			X
4.12	Protection at power transmission from the power source to the drum drive system	X			
4.13	Water system if any	X			
4.14	Exhaust system of the auxiliary engine	X			
4.15	Requirements for working platform at the charge device	X		X	X
4.16	Requirements for tread at rear underrun protective device of the rear discharge type truck mixer	X		X	
4.17	Requirements for visual aid	X	X	X	

6 Information for use

6.1 General

The information for use shall be drawn up in accordance with ISO 12100:2010, 6.4.

6.2 Instruction handbook

6.2.1 General

The instruction handbook shall be provided by the manufacturer in accordance with ISO 12100:2010, 6.4.5, with the following information:

- a) the duties and conditions under which the machine is intended to be used, in particular with regard to:
 - 1) the materials to be handled including an indication of the limiting characteristics, e.g. weight, consistency of material, road conditions, topographic situation;
 - 2) range of agreed environmental conditions (e.g. wind, temperature);

- 3) that only authorized and trained personnel shall start, operate or interfere with the machine; this shall include special training requirements (e.g. for driving, operation, service, maintenance);
- b) specification of the limitation of the hoist points;
- c) special instructions on maintenance and inspection;
- d) instruction that the working platform shall be kept clear;
- e) the specification of any personal protective equipment to be used when operating the machine and the hazards which it is designed to protect against;
- f) a statement that the instructions for use of the truck or trailer manufacturer shall be followed;
- g) the technical data of truck or trailer the mixer device is designed for;
- h) information about the control system including emergency-stop system;
- i) the rated drum capacity;
- j) information that the technical limits of the truck or trailer (non-road operation) and/or national road traffic regulations apply;
- k) information about protection against unintended rotation of the drum in addition to engaging the drum-locking device:
 - 1) locking the truck cabin; the ignition key of the truck engine or auxiliary engine shall be under the control of the person to be protected; any further key shall be inaccessible;
 - 2) the starter battery shall be disconnected;
 - 3) other energy sources shall be disconnected;
- l) instruction that when the operator leaves the machine, she/he shall switch off the ignition of the truck or auxiliary engine and secure the ignition key against unintended use;
- m) reference to the safety instructions of the truck or trailer manufacturer for operation on public roads and on construction sites.

6.2.2 Noise

The information for use shall include the information on noise emission (see [4.1.5.2](#)):

- a) the noise declaration in accordance with [Annex B](#);
- b) if, after taking technical measures for noise control at source, noise emission-levels are so high that further protection of the operator is necessary, the instruction handbook shall recommend possible measures to reduce noise emission further and, if necessary, the wearing of personal hearing protection.

The same information as that given in the information for use shall be given in the technical sales literature providing performance data of the truck mixer.

For an example of a noise emission declaration, see [Table C.1](#) of [Annex C](#).

6.2.3 Operation

6.2.3.1 Operation modes

The information for use shall include a description of all possible operation modes, e.g.:

- a) normal operation at the work station;
- b) emergency operation (see 4.3).

6.2.3.2 Operating process

The information for use shall include:

- a) limitations:
 - 1) the rated drum capacity;
 - 2) information that the maximum gross vehicle weight can be restricted by national road traffic laws;
 - 3) information that the maximum permitted technical axle load of the vehicle shall not be exceeded;
 - 4) information that the permitted technical gross vehicle weight of the vehicle shall not be exceeded;
- b) the need for load securing of additional equipment;
- c) driving conditions e.g. physical factors having an influence on the stability of the vehicle during driving (e.g. truck or trailer technology, load, drum revolutions, concrete consistency, shifting of the centre of gravity, lateral acceleration, driving speed, road conditions, yielding ground, inclination);

NOTE 1 Driving conditions can be restricted by national road traffic laws.

- d) information that before starting to drive, all pressure vessels shall be de-pressurized (e.g. pneumatic pressurized water system);
- e) a warning stating that truck mixer drivers need to be instructed specially on safe driving behaviour;
- f) details of a restarting procedure to be followed after an unintended stop.

NOTE 2 An example for an unintended stop can be stalling the truck engine.

6.2.3.3 Emergency stop

The information for use shall include:

- a) information that the emergency-stop controls shall not be used for normal stopping;
- b) information that restarting operation shall be preceded by an inspection aiming at:
 - 1) determining the reason for operating the emergency stop;
 - 2) repairing the fault, if any;
- c) details of a restarting procedure to be followed after an emergency stop.

6.2.4 Maintenance and repair

6.2.4.1 General

Information shall be given about actions to be taken before starting maintenance procedures (e.g. start of maintenance works only after cooling phase and check of surface temperature).

The employer shall check and ensure that maintenance work and inspections which cannot be carried out from ground level or fixed working places shall be carried out from separate means of access to be provided by the employer, e.g. working platform, ladder.

6.2.4.2 Information for works inside the drum

The instructions for use shall describe:

- a) preconditions before entering the drum:
 - 1) procedure for verifying if the drum-locking device can be used (e.g. weight comparison to empty truck mixer);
 - 2) procedure for operating the drum-locking device;
 - 3) procedure for securing the truck mixer against unintended use and/or movement;
 - 4) procedure for entering and exiting the drum;
 - 5) safety measures to follow when staying inside the drum;
 - 6) personal protective wear (e.g. helmet, earplugs) and ventilation (e.g. external fan);
 - 7) appropriate protective measures to reduce electrical hazards (e.g. grounding, use of isolating transformers);
 - 8) safety precautions against torch cutting and welding;
- b) safety measures for works inside the drum, e.g. for protection against sharp edges at the fins, suitable covering of the edges and/or the use of appropriate personal protection equipment (by the operator, e.g. helmet, earplugs, goggles).

Truck mixer drum cleaning systems may provide an alternative for cleaning. Additional hazards arising from the use of such a separate machine are not covered by this document.

6.2.4.3 Hydraulic system

The instruction handbook shall give data on maintenance of the hydraulic system, e.g. inspection intervals, location of liquid-level indicator, filling and drainage points, inspection and monitoring points, instructions on handling the hydraulic fluid used, pressure-relief mechanisms, data on servicing, and on the service period of the hydraulic hoses and their annual inspection for operational safety.

6.2.4.4 Pneumatic system

The instruction handbook shall give data on maintenance of the pneumatic system, e.g. service and monitoring points, pressure-relief mechanisms.

NOTE Inspection periods and procedures can be subject to national regulations.

6.2.4.5 Periodic safety inspection

The instruction handbook shall give information on the recommended periodic safety inspection.

The instructions shall indicate the truck mixer to be inspected for operational safety by a competent person at least once a year. The periodic safety inspection is essentially a visual and functional on-site inspection by the competent person for safety-assessment purposes.

6.3 Information and warnings

6.3.1 Labelling for the control device

The labelling for the control device shall indicate the function of the control device and the direction of the initiated movement.

The labelling for the control device of the drum shall indicate the turning direction of the drum and the direction of material flow.

The label shall be located close by or on the control device.

6.3.2 Warnings

Labels showing residual risks shall be provided.

6.4 Marking

The truck mixers shall at least be marked visibly, legibly and permanently in accordance with ISO 12100:2010, 6.4.4, with the following minimum particulars:

- a) the business name and full address of the manufacturer and, where applicable, an authorized representative;
- b) designation of the machinery;
- c) mandatory marking;

NOTE For machines and their related products intended to be put on the market in EEA, this is the CE marking as defined in the European applicable directive(s), e.g. Machinery, Outdoor Noise, EMC, PED.

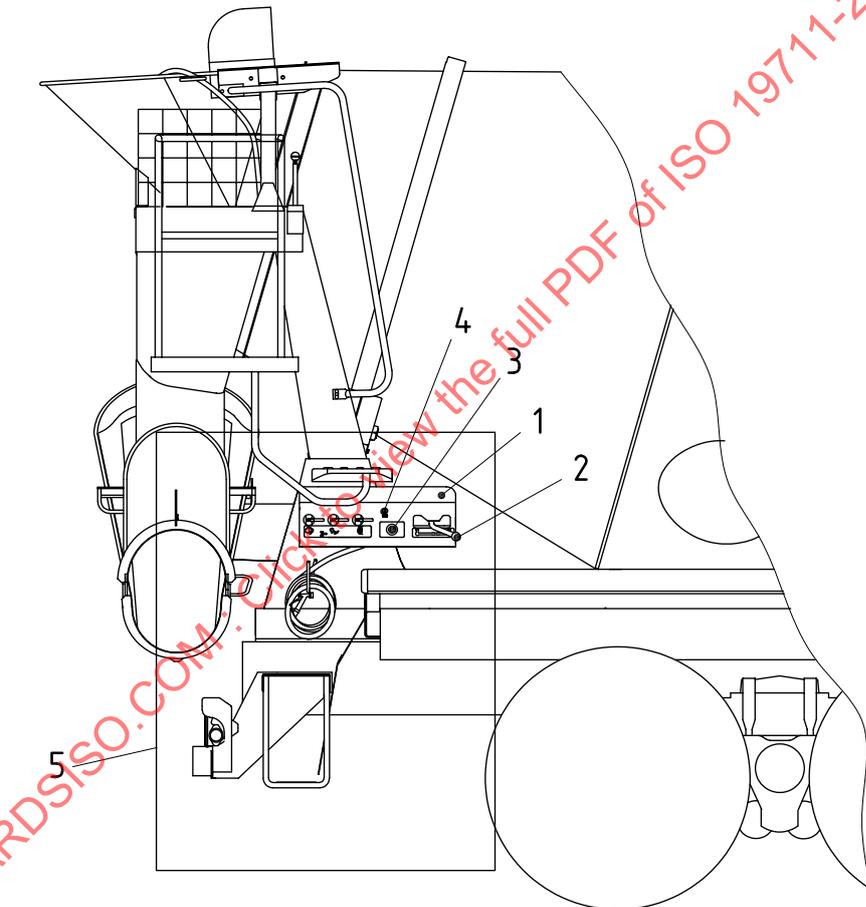
- d) designation of series or type;
- e) serial number, if any;
- f) the year of construction, that is the year in which the manufacturing process is completed;
- g) rated capacity of the drum.

Annex A (informative)

Figures

NOTE The following figures represent only examples and not depictions of technical solutions. Each figure is related to the specific aspect and does not cover all safety requirements described in [Clause 4](#).

A.1 Example of a work station



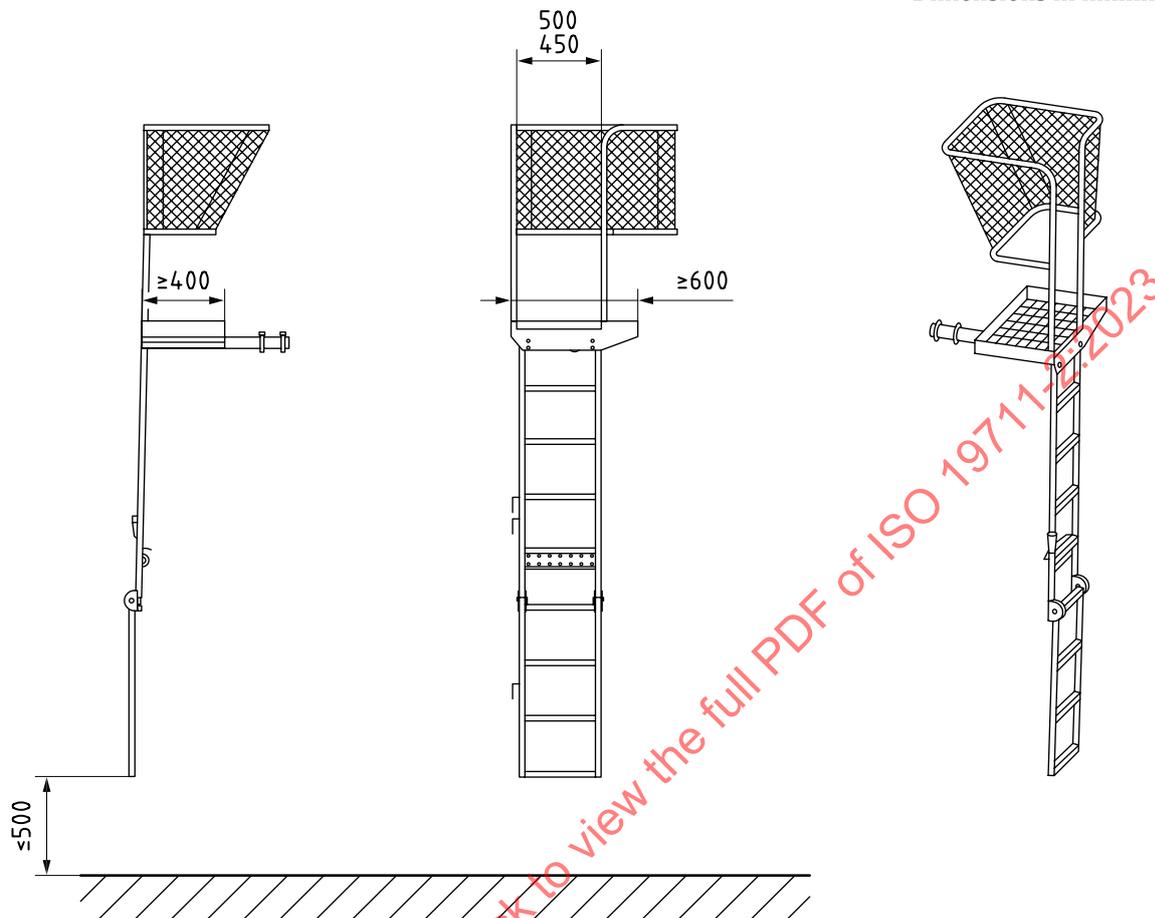
Key

- 1 control station
- 2 control device
- 3 emergency stop
- 4 working light switch
- 5 work station

Figure A.1 — Example of a work station

A.2 Dimensions for the access ladder to the working platform

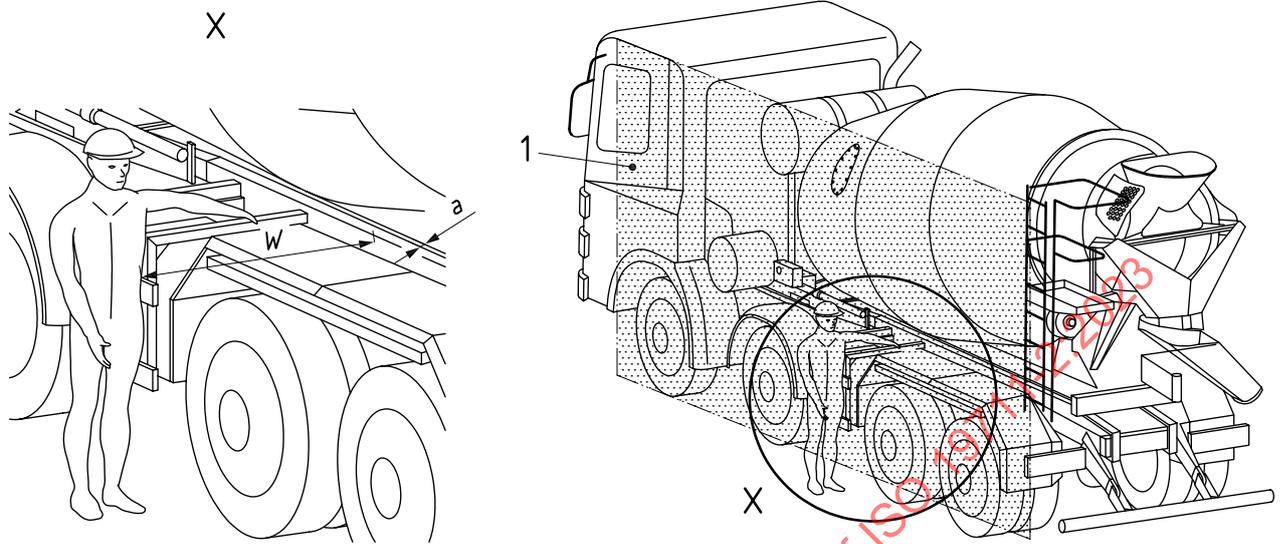
Dimensions in millimetres



NOTE The “self-closing barrier” is not shown in this figure for clarity.

Figure A.2 — Ladder and working platform for a truck mixer

A.3 Minimum clearance a depending on distance W to the reference plane, according to [Table 1](#)

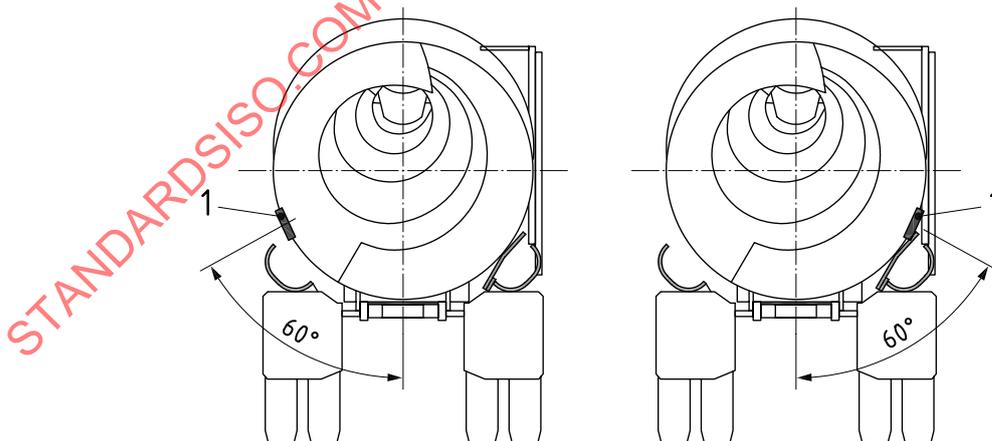


Key

- a minimum clearance
- 1 reference plane
- W distance to the reference plane

Figure A.3 — Distance to the reference plane

A.4 Cross-sections (view from cabin side) of the truck mixer to indicate the positions of the drum access hole when the drum is locked by the drum-locking device

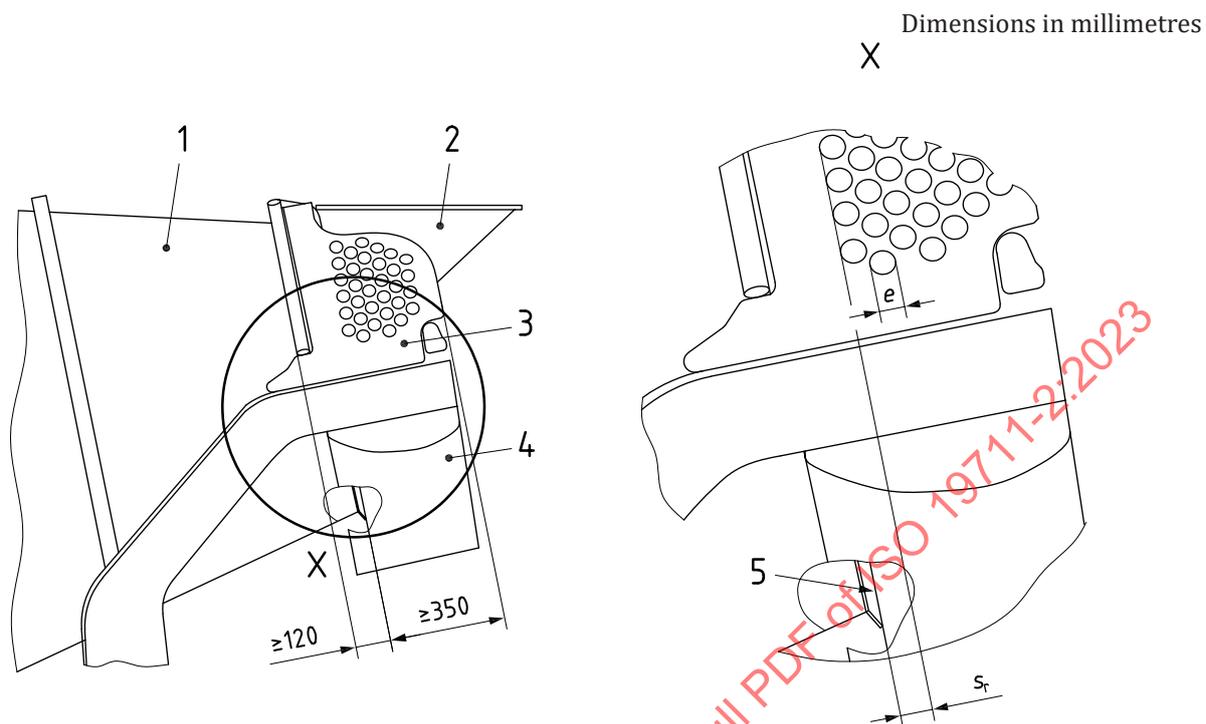


Key

- 1 drum access hole

Figure A.4 — Cross-sections drum access hole –drum position with engaged drum-locking device

A.5 Fixed guard at drum opening



Key

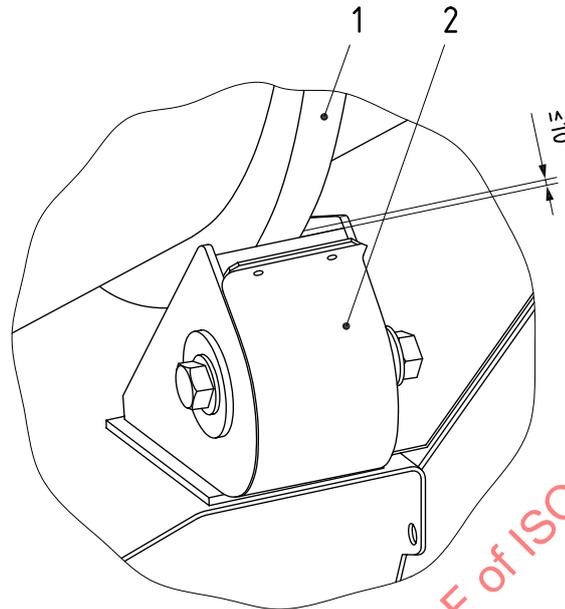
- 1 drum
- 2 charge device
- 3 fixed guard
- 4 discharge hopper
- 5 edge of drum opening

- e diameter of the openings
- s_r distance of the openings to the hazard zone

Figure A 5 — Fixed guard at drum opening

A.6 Maximum clearance between the drum roller cover and the drum track ring

Dimensions in millimetres



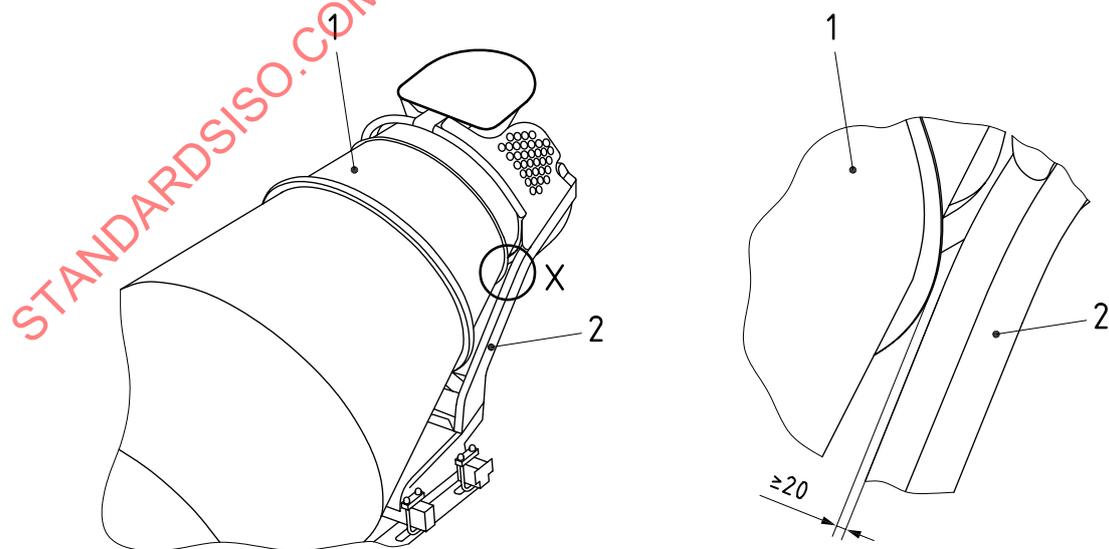
Key

- 1 drum track ring
- 2 drum roller cover

Figure A.6 — Drum roller cover-drum track ring

A.7 Minimum clearance between the drum and the supporting arm

Dimensions in millimetres



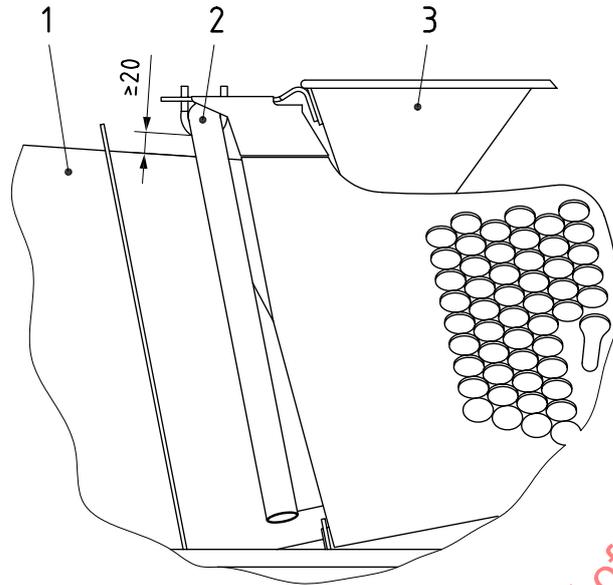
Key

- 1 drum
- 2 supporting arm

Figure A.7 — Drum - supporting arm

A.8 Minimum clearance between the drum and the charge device bracket

Dimensions in millimetres



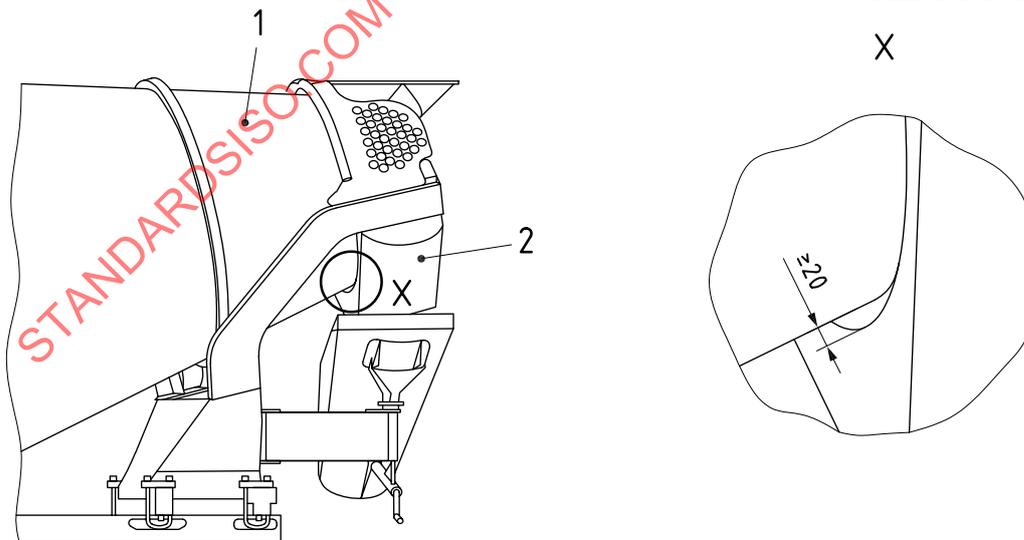
Key

- 1 drum
- 2 charge device bracket
- 3 charge device

Figure A.8 — Drum - charge device bracket

A.9 Minimum clearance between the drum and the discharge hopper

Dimensions in millimetres



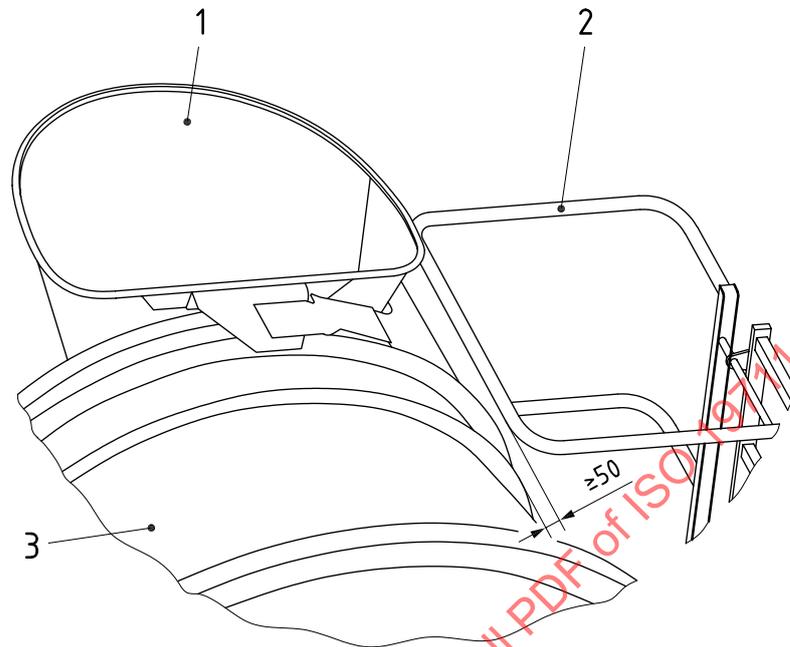
Key

- 1 drum
- 2 discharge hopper

Figure A.9 — Minimum clearance between drum and discharge hopper

A.10 Minimum clearance between the drum and the guard rail at working platform

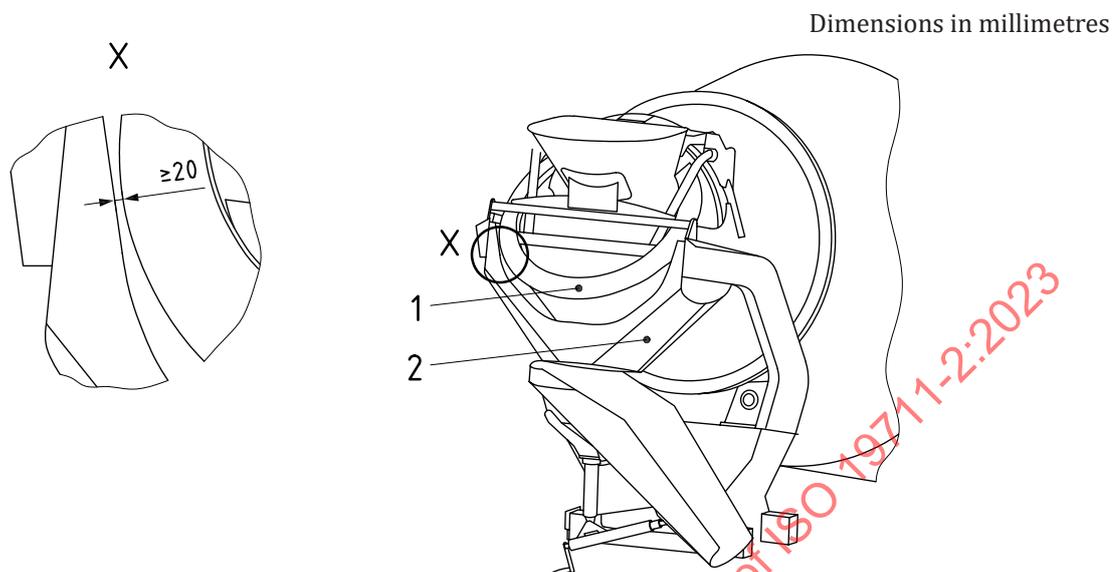
Dimensions in millimetres

**Key**

- 1 charge device
- 2 guard rail at working platform
- 3 drum

Figure A.10 — Minimum clearance between drum and guard rail at working platform

A.11 Minimum distance between the drum closure system and the discharge hopper

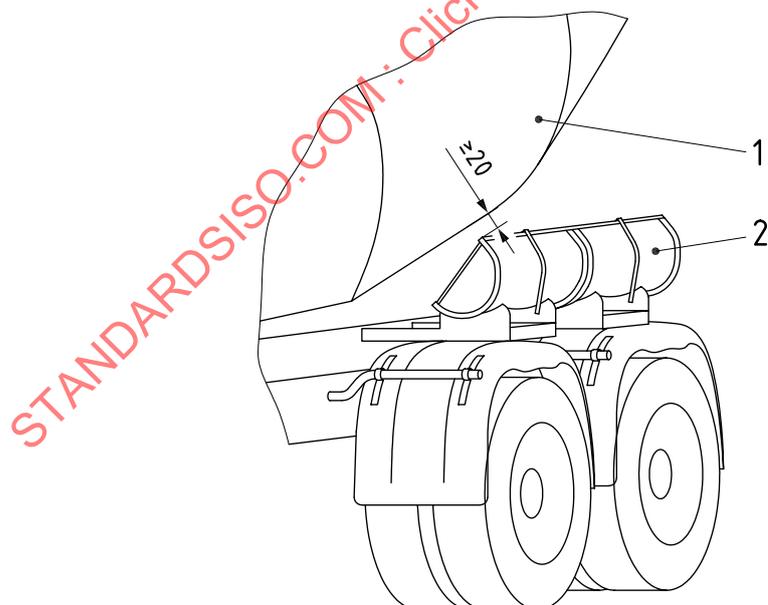


Key

- 1 drum closure system
- 2 discharge hopper

Figure A.11 — Minimum distance between drum closure system and discharge hopper

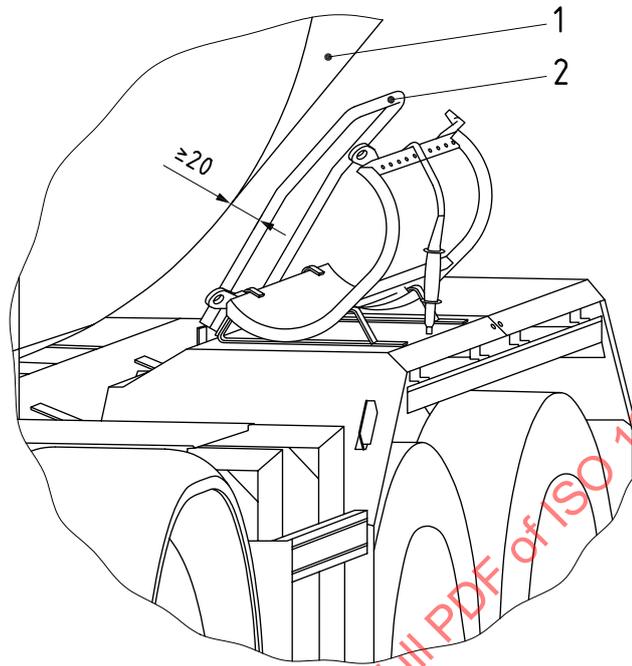
A.12 Minimum clearance between the drum and extension chute



Key

- 1 drum
- 2 extension chute

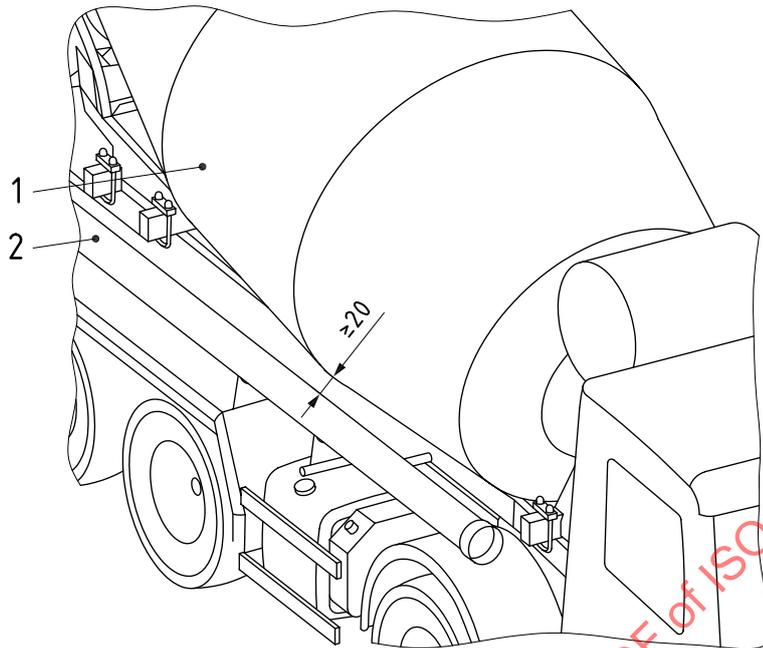
Figure A.12 — Minimum clearance between the drum and extension chute

A.13 Minimum clearance between the drum and extension chute with bracket**Key**

- 1 drum
- 2 bracket

Figure A.13 — Minimum clearance between the drum and extension chute with bracket

A.14 Minimum clearance between the drum and concrete delivery pipe



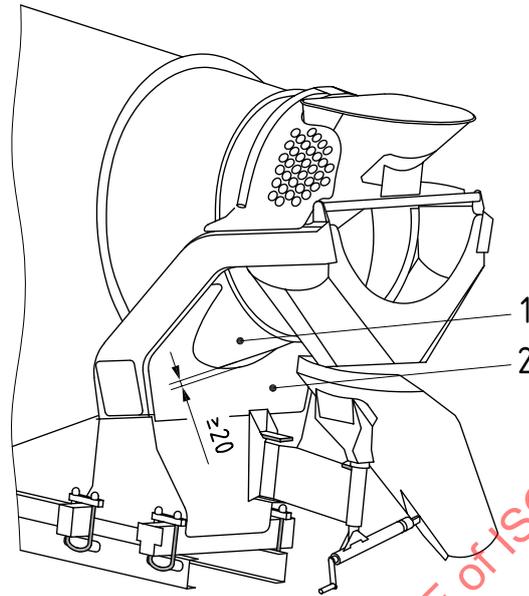
Key

- 1 drum
- 2 concrete delivery pipe

Figure A.14 — Minimum clearance between the drum and concrete delivery pipe

A.15 Minimum clearance between the drum and the rear splash guard

Dimensions in millimetres



Key

- 1 drum
- 2 rear splash guard

Figure A.15 — Drum - rear splash guard

A.16 Minimum dimensions of the visibility test rectangle (VTR)

Dimensions in millimetres

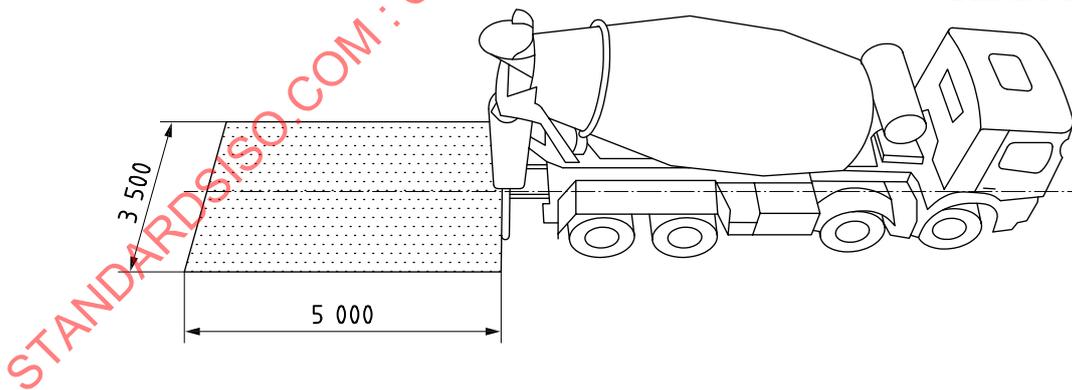
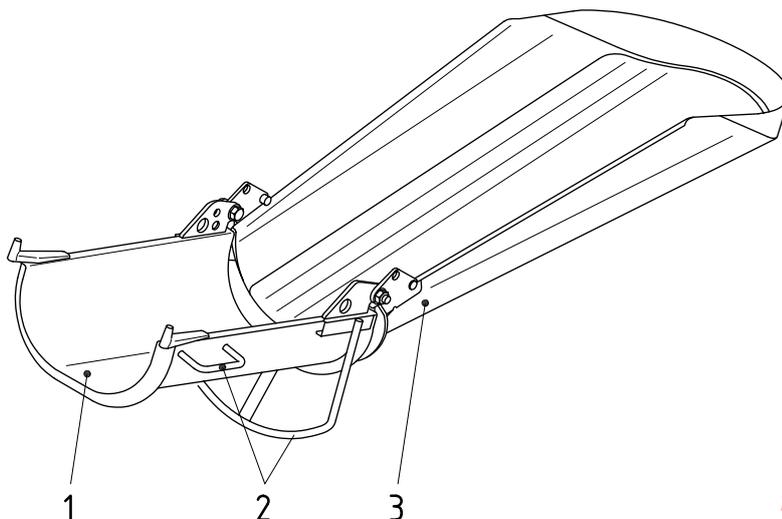


Figure A.16 — Minimum dimensions of the visibility test rectangle (VTR)

A.17 Example of a flip-over chute

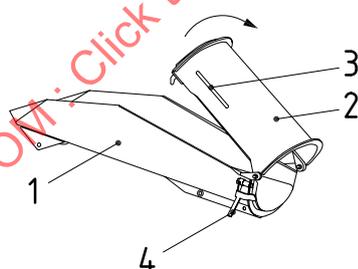


Key

- 1 flip-over chute
- 2 example of handles
- 3 swivel chute

Figure A.17 — Example of flip-over chute

A.18 Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 1)



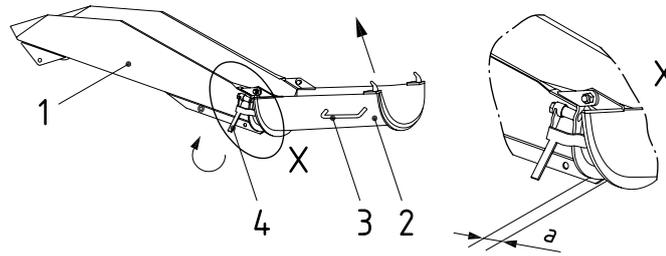
Key

- 1 swivel chute
- 2 flip-over chute
- 3 handle
- 4 mechanical stop

NOTE Via the handle (3), the operator moves the flip-over chute (2) towards its lowered end position shown in [\(Figure A.20\)](#).

Figure A.18 — Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 1)

A.19 Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 2)



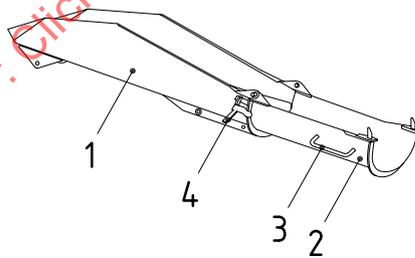
Key

- 1 swivel chute
- 2 flip-over chute
- 3 Handle
- 4 mechanical stop

NOTE The lowered end position cannot be reached, as a mechanical stop (4) blocks further movement. The mechanical stop (4) ensures a residual gap between lower edges of swivel chute (1) and flip-over chute (2). The risk of crushing is reduced. To bring the flip-over chute to the lowered end position (Figure A.20), the operator is enforced to lift the flip-over chute (2) with one hand at the handle (3) and to move the mechanical stop (4) with his or her other hand at the same time.

Figure A.19 — Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 2)

A.20 Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 3)



Key

- 1 swivel chute
- 2 flip-over chute
- 3 handle
- 4 mechanical stop

NOTE Flip-over chute at lowered end position.

Figure A.20 — Example of technical solution for enforced two-hand operation to bring the flip-over chute to its lowered end position (Phase 3)