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**INTERNATIONAL STANDARD**



**1819**

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## **Continuous mechanical handling equipment — Safety code — General rules**

*Engins de manutention continue — Code de sécurité — Règles générales*

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[ISO 1819:1977](https://standards.iteh.ai/catalog/standards/sist/4016359d-cd6b-4f2a-823b-c616e6d0b075/iso-1819-1977)

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**Descriptors :** handling equipment, continuous handling, safety requirements.

## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1819 was developed by Technical Committee ISO/TC 101, *Continuous mechanical handling equipment*, and was circulated to the member bodies in March 1976.

It has been approved by the member bodies of the following countries :

Australia	France	South Africa, Rep. of
Austria	Germany	Spain
Belgium	India	Sweden
Bulgaria	Japan	Turkey
Chile	Mexico	United Kingdom
Czechoslovakia	Philippines	U.S.S.R.
Finland	Poland	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Netherlands  
Norway

This International Standard cancels and replaces ISO Recommendation R 1819-1970, of which it constitutes a technical revision.

# Continuous mechanical handling equipment – Safety code – General rules

## 0 INTRODUCTION

It must be understood that the present International Standard applies only to conveying devices that have been correctly designed, and constructed and erected with care.

It must also be understood that the conveying device has been selected according to the characteristics of the product or the objects being conveyed, and is suitable for the working conditions.

When the equipment conveys dangerous, noxious, toxic or harmful products, the user shall inform the manufacturer and if necessary the erectors, and specify the special safety conditions to be complied with.

## 1 GENERAL

### 1.1 Scope

This International Standard sets out safety rules relating to continuous mechanical handling equipment, including its construction, installation, utilization and maintenance, to ensure that it is used to the best advantage, and to prevent, as far as possible, any accidents or mishaps that could arise from misuse.

To this end, these rules provide precise directives necessary to comply with legal texts (see appendix Z) and requirements decreed by governing bodies in certain countries.

### 1.2 Field of application

The safety rules laid down in this International Standard apply in the normal working conditions defined in 1.3.1, regardless of the use for which the equipment is intended.

These safety rules limit the supplier's responsibility to continuous mechanical handling equipment proper, excluding the structures (building frameworks, planks, etc.) to which such equipment is affixed or on which it is placed and for which the user is responsible, except when such structures have been designed, supplied and erected by the conveying device manufacturer.

The sole object of these rules is the safety of the personnel defined in 1.3.2.

Skilled personnel – fitters, maintenance and repair personnel, who only work from time to time at the request of the person responsible for the plant – shall observe special rules, particularly those set out in 2.3.17 to 2.3.21.

Persons whose duties do not demand their presence on the plant or in the vicinity of the equipment under consideration shall observe orders forbidding access to certain areas.

## 1.3 Definitions

**1.3.1 normal working conditions** : Specified conditions as agreed by the interested parties for the use of continuous mechanical handling equipment.

These normal working conditions will either be defined by the user and agreed with the manufacturer at the time of passing the order, or defined for standard equipment in the manufacturer's catalogue when it is issued.

**1.3.2 personnel** : Persons essential to the use (the operation) of the continuous mechanical handling equipment itself and persons legitimately in the vicinity.

## 1.4 General plan

The safety code is divided into two parts :

- a) General rules relating to all continuous mechanical handling equipment for loose bulk materials or unit loads (covered by this International Standard).
- b) Special rules for continuous mechanical handling equipment for loose bulk materials or unit loads. These rules, written for individual appliances or groups of appliances, are covered by separate International Standards.

Each part of the safety code is divided into three clauses dealing with the safety rules applying to the following stages :

- construction (design and manufacture);
- installation (layout, erection and entry into service);
- utilization (operation and maintenance).

## 2 GENERAL RULES

The construction and operation of all continuous mechanical handling equipment for loose bulk materials and unit loads shall meet

- the legal and local requirements relating to safety in general<sup>1)</sup>;
- the principles laid down in clause 1 of this International Standard;
- the following general rules.

### 2.1 In the construction stage (design and manufacture)

**2.1.1** The stability and strength of the equipment (static or mobile) shall be ensured under all normal working conditions, including climatic conditions as agreed by the contracting parties.

**2.1.2** The whole conveyor path and especially the loading, unloading and transfer points, must be designed so as to avoid as much as possible all spillage of products or conveyed material.

**2.1.3** The slopes and the characteristics of the conveying element must be designed so as to avoid slipping and/or unintentional dropping of the conveyed products under normal working conditions.

The support element of the material or load (belt, buckets, swing trays, etc.) must have sufficient size to be suitable for the transport of the specified product or load.

**2.1.4** To prevent over-running or running backwards of the conveying device, all inclined or vertical appliances shall include a safety device which operates whenever the motive power is cut off or fails and where the load conveyed possesses kinetic or potential energy. Nevertheless, a safety device for this purpose is not compulsory for those special cases which are specified in the special International Standards for each type of appliance.

**2.1.5** Certain fixed or mobile appliances may include an articulated or mobile part in a vertical plane, actuated by motor or manually; in this case, there shall be a compulsory safety device for immobilizing such an articulated part in the event of voluntary or accidental stoppage of the motive power even if the latter is manual.

The lowering and raising system shall be fitted with a safety device to prevent accidental lowering or lifting of the boom, and to prevent kickback of any manually operated crank.

The device for lowering and raising the movable part shall be so located that there is no necessity for the operator to be under the conveyor.

The movement must be limited at the extreme positions, by stops capable of supporting the stress due to the load.

The exceptions to this rule are mentioned in the special International Standards.

**2.1.6** In cases of manual loading and/or unloading, the characteristics of the unit (height, width, speed, etc.) must be suitable for the working stations. The special International Standards give the necessary particulars.

Mechanical devices must be installed :

a) for the loading and unloading of unit loads exceeding 55 kg;

b) for the loading of unit loads when the vertical speed exceeds 0,5 m/s;

c) for the unloading of unit loads when the vertical speed exceeds 0,25 m/s.

**2.1.7** The in-running nips and pinch points of the conveying device (belts, chains, belt pulleys, etc.) and the movable parts (chain sprockets, spur gears, couplings, etc.) shall be protected if they are normally accessible to personnel.<sup>2)</sup>

**2.1.8** When shearing and squeezing points or zones exist on the path of the conveying element (for example at a change of direction, or the close approach to fixed parts, etc.), guards shall be provided.<sup>2)</sup>

**2.1.9** All movable parts giving access through mechanical handling equipment shall be designed so that they cannot be opened whilst the apparatus is working and so that the appliance cannot be used or started while they are "open".

**2.1.10** The loading and unloading openings of the enclosed units (in casing or in housing) must be made in such a way that they prevent access to the moving components; otherwise suitable protection shall be provided.

1) See appendix Z.

2) See the following technical reports :

ISO/TR 5045, *Continuous mechanical handling equipment – Safety code for belt conveyors – Examples for guarding of nip points.*

ISO/TR 5046, *Continuous mechanical handling equipment – Safety code for conveyors and elevators with chain-elements – Examples for guarding of nip points.*

ISO/TR 5047, *Continuous mechanical handling equipment – Safety code for chain conveyors with bearing devices or load carriers – Examples of protection.* (In preparation.)

**2.1.11** Openings in enclosed appliances, which give access to moving parts, shall be guarded by covers which require a hand tool for removal or are locked or are interlocked with the drive to the equipment. Covers which it is necessary to open while the appliance is in operation shall expose a suitable fixed grating, which will prevent access.

**2.1.12** Access to inspection holes shall be easy.

**2.1.13** All the frequently used lubrication points shall be accessible without it being necessary to remove the guards.

**2.1.14** It is recommended that equipment be so designed that cleaning is facilitated.

**2.1.15** Equipment mounted on a moving frame, or any other additional equipment, such as the loading chute, feeders, etc., whether they are self-propelled or hand-operated, shall be provided with a device enabling them to be immobilized.

Safety devices shall be provided to limit the travel of such equipment.

**2.1.16** Wheels or rollers of travelling conveyors and of additional travelling equipment shall be guarded at points accessible to personnel under normal working conditions.

**2.1.17** Whenever an operator remains on the travelling equipment, a platform shall be provided and be so designed as to prevent any accidental contact with mobile components or any part of the fixed installation.

**2.1.18** When mobile appliances or equipment travel alongside an unprotected gangway, warning devices shall be provided.

The special rules specify the form these shall take in each case.

**2.1.19** Sharp edges and corners are to be avoided.

**2.1.20** The projecting parts of moving equipment must be as small as possible.

## **2.2 During the installation stage (layout, erection and entry into service)**

**2.2.1** All powered appliances or complete installations shall carry the following indications permanently and legibly marked in a clearly visible place :

- a) name of manufacturer or supplier;
- b) year of manufacture and serial number.

**2.2.2** All service platforms of appliances and cabins on which personnel may be required to be stationed shall be and remain horizontal.

**2.2.3** All gangways, staircases, steps or platforms provided shall offer a minimum passageway of 0,50 m. They shall be

protected on the open side by guard-rails composed of a hand-rail normally 1 m above the walkway, a knee-rail and a toe-guard, or by an equivalent plain sheeting. In the case of inclined gangways with uninterrupted vertical sheeting on the side remote from the moving appliance, a hand-rail shall be provided on this side. To avoid the risk of trapping by a moving device, the height of the hand-rail can be modified to not less than 0,80 m above the walkway so as to ensure a minimum clearance of 0,50 m between the appliance and the hand-rail.

Access between movable parts of static appliances, or the load that they carry and fixed obstacles, shall be prevented by guards when the free space is less than 0,50 m.

Access between the preset path of mobile appliances and fixed obstacles shall be prevented by guards when the free space is less than 0,50 m.

**2.2.4** There shall be fixed access to platforms, floors, or similar constructions located more than 1,50 m above ground level.

Access should preferably be by a sloping ramp with slats, or by a staircase. The angle of staircases in relation to the horizontal shall not exceed 60°.

If a ladder has to be used, the width between the uprights shall be 0,35 m minimum; on the access side, the free space between the ladder and any continuous obstacle should be 0,60 m minimum; this free space may be reduced to 0,40 m near a localized obstacle of small width; on the opposite side, the free space between the ladder and any obstacle should be 0,20 m minimum. When the ladder is put vertically or at an angle equal to or greater than 70° and its vertical height is equal to or greater than 5 m, a protection (crinoline, guard or other device) should be provided commencing 2,5 m from the starting level.

Suitable landings or resting places shall, where practicable, be provided at intervals of not more than 9 m, and unless strong hand-holds are provided the ladder shall project at least 1 m above each landing or resting place.

**2.2.5** All flooring of platforms or gangways and treads of staircases and steps shall be selected to suit individual installations and working conditions, and shall have a non-slip surface.

**2.2.6** It is recommended that sharp edges and corners be avoided in the areas normally accessible to personnel between the floor and a height of 2 m.

This recommendation need not be followed if such edges and corners are protected.

**2.2.7** In cases where the clearance beneath the appliances, at a passageway, is less than 1,90 m, it is recommended that access be by means of a gangway running over the appliance.

**2.2.8** All authorized passageways, protected if necessary, shall be indicated in a clear manner.

**2.2.9** In cases where appliances which penetrate into a pit or extend through floors leave openings, the latter shall be protected by guard-rails and toe-guards.

**2.2.10** Where appliances pass above work stations or passageways, suitable protection shall be provided against accidental dropping of conveyed materials.

**2.2.11** Sequence interlocks shall be provided so that no mechanical handling appliance can supply another appliance which is inoperative or has reached its full capacity.

**2.2.12** Instantaneously operating manual stop-lock devices shall be provided either continuously or at selected points along the installation. Resetting of these devices shall be carried out by authorized personnel and only after the fault has been rectified.

**2.2.13** When an appliance extends out of sight of the control station operator, audible or visual signals shall be provided to warn personnel that the starting of the appliance is imminent.

**2.2.14** All starting and stopping devices shall be clearly indicated and easily accessible. It is recommended that they be painted to a standard pattern.

**2.2.15** It is recommended that all lubrication points be painted to a standard pattern.

**2.2.16** Gangways, hand-rails, staircases, ladders, guards, etc. shall be erected before the installation is put into service.

**2.2.17** The feeding and discharge controls, either manually or mechanically operated, shall be easily accessible. They shall, where necessary, be placed so as to permit supervision of the flow.

**2.2.18** The openings of feeding or transfer hoppers and chutes shall be guarded if normally accessible to personnel. It is recommended that inspection doors be provided on large hoppers and chutes.

**2.2.19** Counterweight tension devices shall be guarded at points normally accessible to personnel. Guards shall prevent access to the space directly below the counterweight; in the absence of these guards, sustaining devices shall be provided, giving a clearance of at least 2,5 m above ground or other operating level.

### **2.3 During the utilization stage (operation and maintenance)**

**2.3.1** No continuous mechanical handling equipment shall be used for duties other than those for which it is designed nor under conditions other than those stated in the sales contract and in the installation and maintenance booklets.

**2.3.2** The user should be careful to ensure a regular feed, avoiding over-loading. In particular, the user shall not change the feeding points, particularly not their position, or increase the flow, without previously consulting the constructor.

Clear operating instructions concerning the loading of the appliances shall be prominently displayed adjacent to the loading positions: they shall include the permissible unit load, its positioning and its limiting dimensions.

**2.3.3** It shall be strictly forbidden to use continuous mechanical handling equipment for conveying people, unless it has been specifically designed for that purpose and meets the special rules laid down in connection with the conveyance of people.

**2.3.4** Continuous mechanical handling equipment, particularly its conveying elements, shall be kept in proper working condition as recommended by the manufacturer and shall be well maintained at all times.

All loading and working stations and the passageways shall be kept clear and clean.

**2.3.5** The inspection, adjustment, maintenance and cleaning of moving parts (belts, pulleys and idlers, chains, sprockets, etc.) and of cleaning devices shall be carried out regularly according to the manufacturer's instructions.

The frequency of these operations will depend on the nature of the conveyed materials. With the exception of automatic cleaning, or in the case of special devices designed to allow cleaning while the equipment is in operation, these operations shall only be undertaken when the equipment is at rest, and after rendering the starting devices inoperative.

**2.3.6** No inspection hole shall be opened while the appliance is in operation unless it complies with rule 2.1.11.

**2.3.7** No one, except those so authorized, shall operate or interfere with the normal working of the plant; in particular, all starting operations shall be carried out by qualified and competent personnel only.

**2.3.8** Normal and emergency stopping devices shall be made known to all personnel and be easily accessible; all areas giving access to them shall be kept clear of obstacles. Their proper working shall be periodically checked.

**2.3.9** All restarting operations on an appliance which has been inoperative because of an emergency or accidental stoppage shall be preceded by an inspection aiming at

- a) determining the cause of the emergency or accidental stoppage;
- b) repairing the fault.

**2.3.10** It shall be strictly forbidden to cross over or under an appliance except at the points specially provided for the purpose.

**2.3.11** All adjustments, whether mechanical or electrical, shall be carried out by competent and authorized persons, particularly in the case of safety devices.

**2.3.12** Repairs, and removal of protective enclosures or panels, shall only be carried out after stopping the equipment, and after starting devices have been rendered inoperative, by a competent person appointed for that purpose.

Recommissioning shall be carried out only after the protective devices have been replaced and an order received from the responsible person.

**2.3.13** It shall be forbidden to carry out any lubrication while an appliance is in operation, except in cases where the parts to be lubricated are so located or there are special devices which will permit this without danger.

If, for lubrication purposes, it is necessary to remove or to open guards, lubrication shall only be carried out with the equipment rendered inoperative as stated in rule 2.3.12.

**2.3.14** A log-book should be kept for each appliance or each installation.

**2.3.15** Suitable training (with particular reference to the operating and maintenance booklets) shall be given to continuous mechanical handling equipment personnel, both operating and maintenance, as in the long run this is the best form of accident prevention.

**2.3.16** The user shall not make alterations which affect the design, construction, installation or handling requirements of the appliances without the consent of the constructor or the contractor, as some alterations may give rise to detrimental consequences.

**2.3.17** Inspection and adjustment of continuous mechanical handling equipment, in motion or in use, should only be carried out with guards in position unless it would be impracticable for the said operations to be carried out other than with the guards removed. If the guards are removed, such removal must be restricted to the immediate area involved, taking all necessary precautions and especially forbidding any approach to nip points.

**2.3.18** If the area where guards are removed is situated in a working area or where people walk, such an area must be fenced off to prevent personnel approaching it when the appliance is in motion.

**2.3.19** When guards are not in position, and the appliance is in motion, work shall only be done from a stable standing place. If a ladder is required, it must be secured in position or firmly held by a second person.

**2.3.20** When guards have been removed from continuous mechanical handling equipment in motion, work shall only be undertaken by persons authorized and well acquainted with the risks associated with machinery in motion. Such persons must wear close-fitting overalls with no loose ends, preferably made in one piece.

**2.3.21** If work has to be carried out on unfenced machinery in motion, a second person, well acquainted with the actions to be taken in case of emergency, must keep watch on the person at work, and hold himself close to and ready to operate a stop device.

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APPENDIX Z  
(updated February 1977)

**LIST OF SAFETY REGULATIONS**

Makers and users alike should make sure that all safety devices comply with government and local regulations, and also with the special requirements of the ISO publications.

**AUSTRALIA**

Australian Standard 1755 – SAA Conveyor Safety Code.

Each State within Australia has specific regulations which are closely aligned with this code.

**AUSTRIA**

Allgemeine Dienstnehmerschutzverordnung, BGBl. Nr. 265/1951 in der Fassung der Verordnung BGBl. Nr. 32/1962 Maschinen-Schutzvorrichtungsverordnung, BGBl. Nr. 43/1961.

Verordnung zum Schutze des Lebens und der Gesundheit von Dienstnehmern bei Ausführung von Bauarbeiten, Bauneben- und Bauhilfsarbeiten, BGBl. Nr. 267/1954.

Verordnung über den Schutz des Lebens und der Gesundheit von Dienstnehmern in Eisen- und Stahlhüttenbetrieben, BGBl. Nr. 122/1955.

Verordnung über den Schutz der Dienstnehmer und der Nachbarschaft beim Betrieb von Steinbrüchen, Lehm-, Ton-, Sand- und Kiesgruben sowie bei Haldenabtragungen, BGBl. Nr. 253/1955.

Verordnung über den Schutz des Lebens und der Gesundheit von Dienstnehmern in Textilbetrieben, BGBl. Nr. 194/1956.

Allgemeine Bergpolizeiverordnung, BGBl. Nr. 114/1959 in der Fassung der Verordnungen BGBl. Nr. 185/1969 und BGBl. Nr. 22/1972.

Arbeitnehmerschutzgesetz BGBl. Nr. 234/1972.

Vorschriften des Osterreichischen Verbandes für Elektrotechnik, insbesondere :

ÖVE-E 1, Errichtung von Starkstromanlagen unter 1 000 V.

ÖVE-E 5, Betrieb von Starkstromanlagen, Teil 1 : Grundsätzliche Bestimmungen.

ÖVE-EN 1, Teil 1/75 Errichtung von Starkstromanlagen mit Netzspannung bis 1 000 W, = 1 500 W  
Teil 1 : Begriffe und Schutzmaßnahmen.

**BELGIUM**

There are no special government regulations in Belgium.

**BULGARIA**

The council of Ministers disposition No. 187/1968.05.09.

BDS 10705-73.

The Ministry of Transport Safety Regulation No. D-05-001/1972, concerning safety of loading-unloading operations.

**CZECHOSLOVAKIA**

Labour Code No. 65/1965 Sb. and the implementing provisions in accordance with the valid amendments.

Order in council No. 41/1938 Sb. – General rules for life and health protection of unskilled workers.



Order in council No. 53/1931 Sb. — Rules for life and health protection of workers in building industry in the meaning of order in council No. 97/1948 Sb.

Law Gazette :

- No. 33/1965 Sb. : Law of regressive compensations.
- No. 77/1965 Sb. : Decree of Ministry of Building Industry on training, ability and registration of attendance of building machines.
- No. 20/1966 Sb. : Law of care of health of people.
- No. 45/1966 Sb. : Decree of Ministry of Health on creation and preservation of sound living conditions :
  - a) Vol. 3/1958, No. 5 : Directives of hygienic conditions of construction of industrial plants.
  - b) Vol. 16/1959, No. 20 : Directives of hygienic conditions of activity and maintenance of industrial plants.
  - c) Vol. 28/1967, No. 32 : Directives of health protection against unfavourable effects of noise.
  - d) Vol. 29/1967, No. 33 : Directives of health protection against unfavourable action of mechanical vibration.
  - e) Vol. 30/1967, No. 34 : Directives of the Chief Hygienist in Czechoslovakia concerning the greatest concentration of the most important harmful substances in the atmosphere.
- No. 32/1967 Sb. : Decree of the government.
- No. 174/68 Sb. : Law on the State professional inspection of safety of work.
- No. 22/76 Sb. and No. 23/76 Sb. : General rules ensuring the safety of work at the stable equipment for loose bulk materials.

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**DENMARK**

Almene Sikkerhedsforskrifter for Maskineri — Redskaber — Værktøjer.

<https://standards.iteh.ai/catalog/standards/sist/4016359d-cd6b-4f2a-823b-c616e6d0b075/iso-1819-1977>

**FINLAND**

Allgemeine Vorschriften für Maschinen, Gesetz des Sozialministeriums 299/58 über Arbeitsschutz.

Law for occupational safety (299/58).

Decision of the Council of State that includes directives to be observed within civil engineering (274/69).

Decision of the Council of State for the prevention of noise (730/74).

Machines, tools and technical equipment (safety regulations No. 1).

Cranes (safety regulations No. 22).

Safety regulations on electricity (Decision of Ministry of Trade and Industry No. 205/74).

**FRANCE**

**CODE DU TRAVAIL**

Articles L 233-2, L 233-3, L 233-4 et les règlements d'application.

**MINISTÈRE DU TRAVAIL**

Décret n° 47-1592 du 23 août 1947, portant règlement d'administration publique en ce qui concerne les mesures particulières de sécurité relatives aux appareils de levage autres que les ascenseurs et monte-charge (et textes d'application).

Décret n° 62-1454 du 14 novembre 1962 (électricité).

Décret n° 65-48 du 8 janvier 1965, concernant la protection et la salubrité dans les chantiers du bâtiment et des travaux publics. Titre II — «Appareils de levage et de manutention».