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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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FOREWORD

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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 general¹⁾;
- 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.²⁾

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.²⁾

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.