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# International Standard



# 7149

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

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## Continuous handling equipment — Safety code — Special rules

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

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**UDC 621.867 : 614.8**

**Ref. No. ISO 7149-1982 (E)**

**Descriptors** : handling equipment, conveyors, continuous conveyors, belt conveyors, apron conveyors, bucket conveyors, scraper conveyors, truck conveyors, overhead conveyors, tray conveyors, swing-tray conveyors, screw conveyors, chutes, hydraulic conveyors, pneumatic conveyors, elevators (lifts), safety requirements.

Price based on 24 pages

## 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 7149 was developed by Technical Committee ISO/TC 101, *Continuous mechanical handling equipment*, and was circulated to the member bodies in August 1980.

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

Australia	France	Romania
Austria	Germany, F.R.	Spain
Belgium	Mexico	Sweden
Czechoslovakia	Netherlands	United Kingdom
Egypt, Arab Rep. of	Norway	USSR
Finland	Poland	

No member body expressed disapproval of the document.

This International Standard cancels and replaces the following International Standards : ISO 1821-1975, 2125-1975, 2149-1975, 2150-1975, 2196-1975, 2381-1972, 2387-1972, 2388-1972, 2389-1972, 2390-1972, 2391-1972, 2392-1972, 3263-1974, 3264-1974, 3276-1975, 3277-1974, 3278-1974, 3279-1974, 3280-1974, 3281-1974, 3283-1974, 5028-1977, 5030-1977, 5035-1977, 5036-1977, 5037-1977, 5038-1977, 5039-1977, 5040-1977 and 5043-1977, of which it constitutes a technical revision.

# Continuous handling equipment — Safety code — Special rules

## 1 Scope

This International Standard specifies, in addition to the general safety rules set out in ISO 1819, the special safety rules to various types of conveyors defined in clause 2.

15 Chutes

16 Hydraulic conveyors

17 Pneumatic continuous handling appliances

18 Light-weight vertical tray elevators

## 2 Field of application

The safety rules laid down in this International Standard apply to the following types of conveyors :

19 Transfer points

20 Mobile supporting structures for continuous handling equipment

1 Mobile conveyors not self propelled

2 Belt conveyors

3 Throwing machines

4 Picking and assembly table conveyors

5 Slat conveyors and apron conveyors

6 Bucket elevators

7 Scraper conveyors and "en masse" conveyors

8 Single strand floor truck conveyors

9 Overhead conveyors

10 Suspended swing-tray and fixed tray or similar conveyors or elevators

11 Screw feeders and conveyors

12 Live roller conveyors

13 Vibratory conveyors

14 Roller and wheel conveyors

## 3 References

ISO 1819, *Continuous mechanical handling equipment — Safety code — General rules.*

ISO 2148, *Continuous handling equipment — Nomenclature.*

ISO 5049/1, *Mobile continuous bulk handling equipment — Part 1 : Rules for the design of structures.*

## 4 Special safety rules

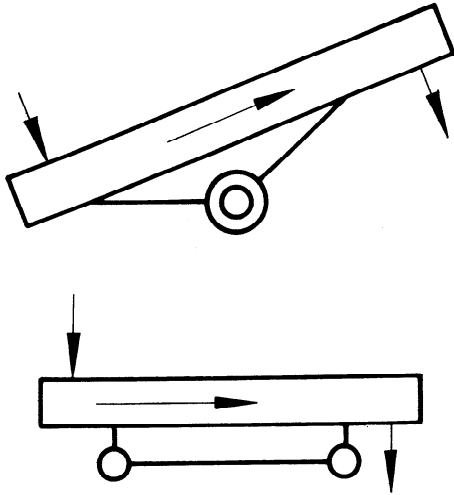
### 4.1 Mobile conveyors not self propelled

#### 4.1.1 Field of application

4.1.1.1 These safety rules apply to conveyors described as follows :

Mobile units on wheels that are not self propelled, carrying continuous handling equipment, whether adjustable in height or not.

4.1.1.2 Sketch



4.1.1.3 Examples

Title	No. from ISO 2148
1) Mobile belt conveyor	2.21.012, + 2.14.0122
2) Shuttle belt conveyor arrangement	2.14.013
3) Telescopic belt conveyors	2.21.013
4) Mobile slat conveyors	2.21.042
5) Stackers	2.21.05
6) Mobile screw conveyors	—

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4.1.2 General rules

The following special safety rules apply in addition to :

- 4.1.2.1 the general rules laid down in ISO 1819;
- 4.1.2.2 the special rules applicable to the conveyor to be mounted on the supporting unit.

4.1.3 Special safety rules

- 4.1.3.1 In the construction stage (design and manufacture)
  - 4.1.3.1.1 When the position of the boom can be adjusted by means of the supporting chassis, this shall be fitted with a safety device to limit the extent of any collapse.
  - 4.1.3.2 During the utilization stage (operation and maintenance)
    - 4.1.3.2.1 It is recommended that the wheels be chocked as soon as the conveyor is in its working position.
    - 4.1.3.2.2 Before moving, the conveyor shall be stopped and brought to the transport position, and the power supply, particularly if electric, shall be disconnected.

This requirement does not apply to small movements (translation or orientation) which may occur in service of the appliance, when it has been designed for this purpose.

4.1.3.2.3 The maximum towing speed, to be indicated by the manufacturer, shall not be exceeded.

4.1.3.2.4 When the conveyor is being moved, nobody is allowed to sit on the machine or to hang beneath it.

4.2 Belt conveyors

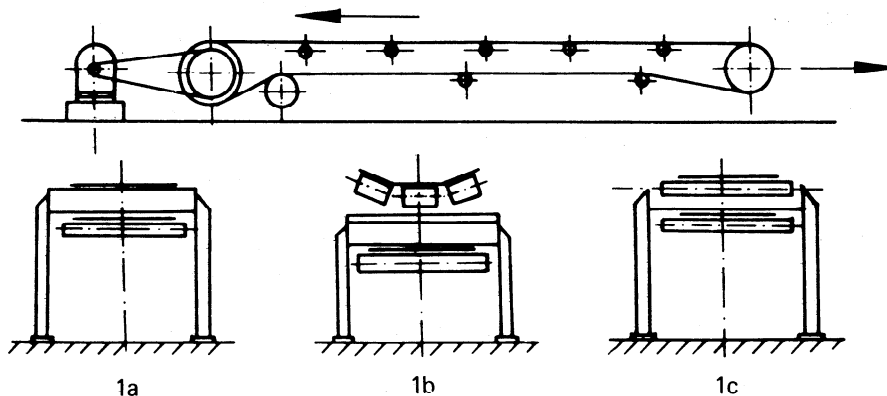
4.2.1 Field of application

4.2.1.1 These special safety rules apply to conveyors described as follows :

Conveyors and feeders for loose bulk materials or unit loads using an endless moving belt (rubber, canvas, steel, plastic, wire mesh, etc.) as the carrying and conveying medium.

The belt may be supported by free-running idlers or suitable flat surfaces.

4.2.1.2 Sketch



4.2.1.3 Examples

Title	No. from ISO 2148
1) Fixed belt conveyors [see 4.2.1.2 sketch a), b) and c)]	2.21.011 + 2.14.011
2) Portable belt conveyors	2.14.0121
3) Movable belt conveyors	2.14.014
4) Mobile belt conveyors	2.14.0122 + 2.21.012
5) Belt feeders	2.13.01
6) Telescopic belt conveyors	2.21.013
7) Steel band conveyors	2.21.02 + 2.14.03
8) Wire mesh belt conveyors	2.21.03 + 2.14.04
9) Chain and cable belt conveyors	2.14.02
10) Stackers	2.21.05 + 2.12.061 + 2.12.062 + 2.12.063
11) Shuttle belt conveyors arrangement	2.14.013
12) Overhead belt transporters	2.12.0749:1982
13) Trippers	2.12.05
14) Corner conveyors	—

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4.2.2 General rules

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

4.2.3 Special safety rules

4.2.3.1 In the construction stage (design and manufacture)

4.2.3.1.1 As permitted by rule 2.1.4 of ISO 1819, no safety device is compulsory when, simultaneously, the mass of each unit load is below 50 kg and when the total design load of material on the sloping part of the appliance is below 500 kg.

4.2.3.1.2 In pursuance of the requirements laid down in rule 2.2.10 of ISO 1819, suitable protection should also be provided against accidental dropping of material adhering to the return belt.

4.3 Throwing machines

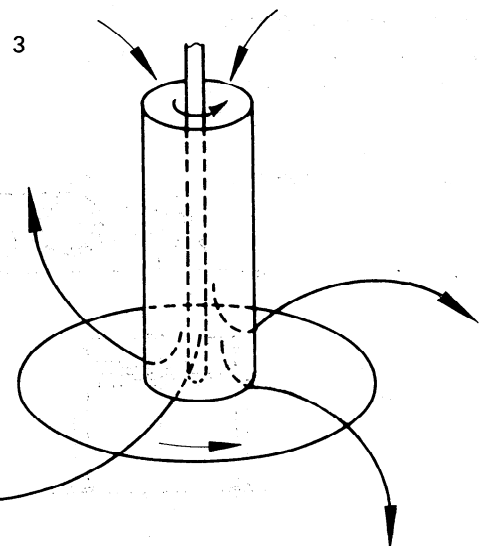
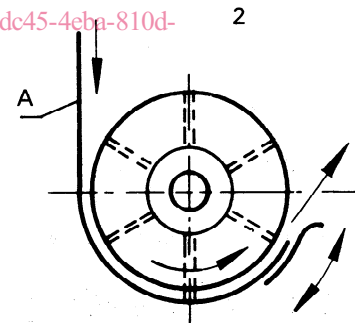
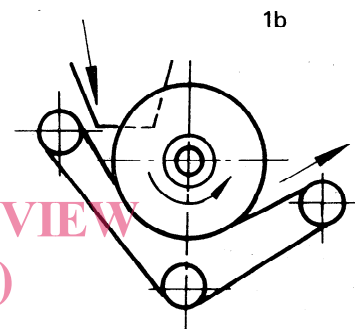
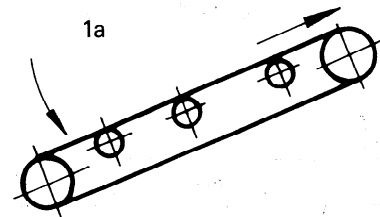
4.3.1 Field of application

4.3.1.1 These special safety rules apply to machines described as follows :

A belt type machine, a vane, or rotating circular plate, intended for throwing loose bulk material at high speed into a predetermined area.

These special safety rules do not apply to snowthrowing machines.

4.3.1.2 Sketches



4.3.1.3 Examples

Title	No. from ISO 2148
1) Bulk throwing machines, belt type (figures 1a, 1b)	2.14.06
2) Throwing machine, vane type (figure 2)	—
3) Throwing machine, rotating circular plate type (figure 3)	—

4.3.2 General rules

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

4.3.3 Special safety rules

4.3.3.1 In the construction stage (design and manufacture)

4.3.3.1.1 All control devices shall be easily accessible and so located as to allow the operator to remain outside the throwing area.

4.3.3.2 During the utilization stage (operation and maintenance)

4.3.3.2.1 Access to the throwing area of these appliances shall be forbidden.

4.3.3.2.2 If it is necessary to enter the throwing area, the individual concerned shall take all necessary measures to prevent the machine being re-started (for example, lock off).

4.3.3.2.3 Visual and sound warning devices shall be operated well before the machine is started or re-started.

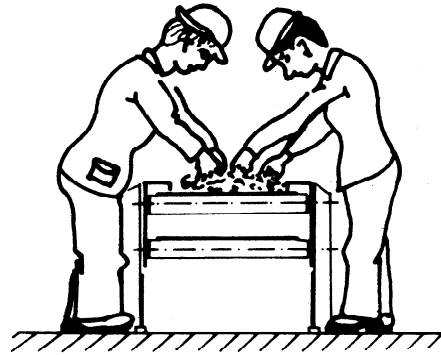
4.4 Picking and assembly table conveyors

4.4.1 Field of application

4.4.1.1 These special safety rules apply to conveyors described as follows :

Conveyors with belts, steel band, wire mesh belts or slats used for carrying unit loads or loose bulk materials, on which manual operations i.e. picking selecting, assembling etc. are being performed.

4.4.1.2 Sketch



4.4.1.3 Examples

Title	No. from ISO 2148
1) Belt assembly and belt table conveyors — with belt	2.21.061
2) Belt assembly and belt table conveyors — with steel band	2.21.062
3) Belt assembly and belt table conveyors — with wire-mesh belt	2.21.063
4) Belt assembly and belt table conveyors — with slats	2.21.064
5) Picking table conveyors	2.14.05

4.4.2 General rules

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

4.4.3 Special safety rules

4.4.3.1 In the construction stage (design and manufacture)

4.4.3.1.1 Continuous side guarding shall be provided for both carrying and return strands at the working positions.

4.4.3.1.2 In addition to rule 2.1.6 of ISO 1819, the belt speed shall not exceed 0,3 m/s when the mass of the heaviest item to be picked up exceeds 5 kg.

4.4.3.2 During the installation stage (layout, erection and entry into service)

4.4.3.2.1 The height of the working surface above the ground or the service platform shall be suitable for the operations being carried out.

4.4.3.2.2 Any picking table conveyor with a belt wider than 0,65 m shall be served by operators on each side of the belt.

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4.4.3.2.3 Adequate space shall be provided for operators to ensure satisfactory level working conditions.

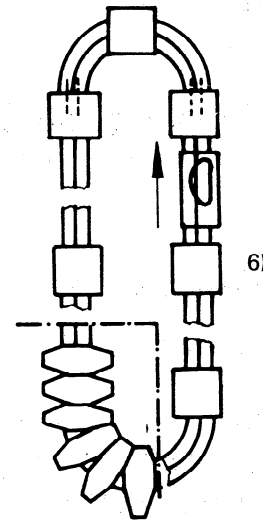
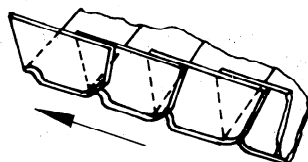
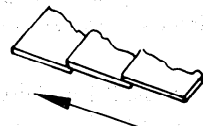
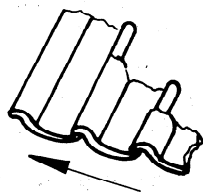
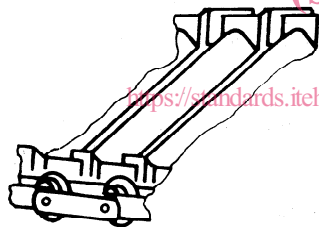
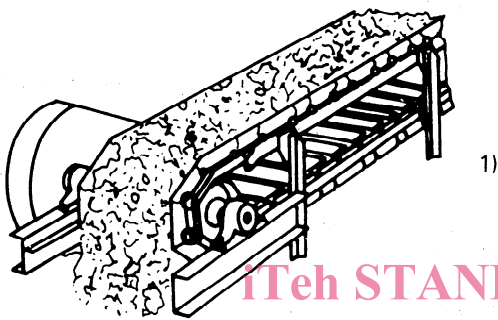
4.5 Slat conveyors and apron conveyors

4.5.1 Field of application

4.5.1.1 These special safety rules apply to conveyors described as follows :

Conveyors for loose bulk materials or unit loads with slats, plates or pans as the carrying medium and with chains as the driving medium.

4.5.1.2 Sketch



4.5.1.3 Examples

Title	No. from ISO 2148
1) Apron conveyors <sup>1)</sup>	2.14.08
2) Apron conveyors <sup>1)</sup>	2.14.081
3) Pan conveyors	2.14.082
4) Apron conveyors with closed pans	2.14.083
5) Slat conveyors (metal or wood)	2.21.04 + 2.21.041 + 2.21.042
6) Continuous (circular) plate conveyors (horizontal)	2.21.07

4.5.2 General rules

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

4.5.3 Special safety rules

4.5.3.1 In the construction stage (design and manufacture)

4.5.3.1.1 In addition to rule 2.1.4 of ISO 1819 relating to inclined conveyors, the conveyor chains shall be confined in order to prevent them from rising in the event of the chains breaking or the conveyor running backwards.

4.5.3.1.2 As permitted by rule 2.1.4 of ISO 1819, no safety device is compulsory when simultaneously the mass of each unit load is below 50 kg and when the total design load of material on the sloping part of the appliance is below 500 kg.

1) Including feeders of the same type (see 2.13.01 and 2.13.02).

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

**4.5.3.2.1** In pursuance of the requirements laid down in rule 2.2.10 of ISO 1819, suitable protection shall also be provided against dropping of small or fine material adhering to the return side of the apron.

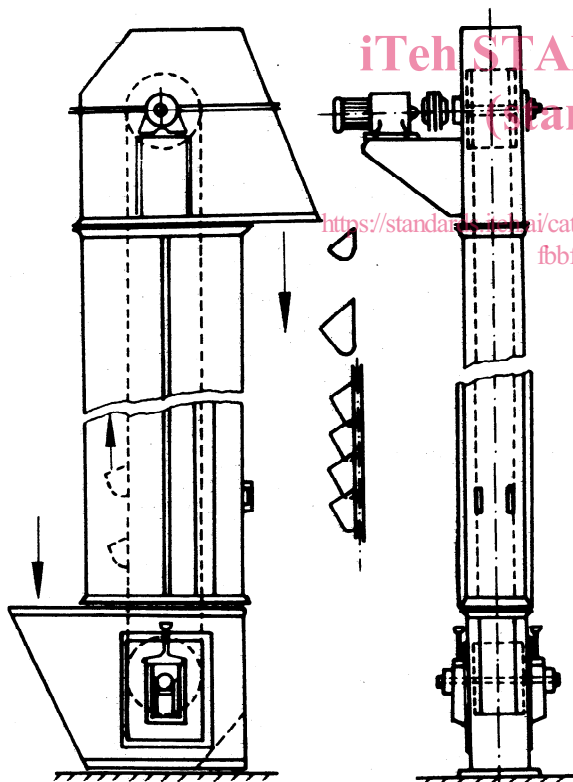
**4.6 Bucket elevators**

**4.6.1 Field of application**

**4.6.1.1** These special safety rules apply to continuous mechanical handling equipment described as follows :

Elevators for loose bulk materials with buckets as the carrying medium attached to a belt or chains as the driving medium.

**4.6.1.2 Sketch**



**4.6.1.3 Example**

Title	No. from ISO 2148
Bucket elevators	2.14.16

**4.6.2 General rules**

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

**4.6.3 Special safety rules**

**4.6.3.1** In the construction stage (design and manufacture)

**4.6.3.1.1** Cleaning doors shall be provided in the elevator boot in accordance with rule 2.1.11 of ISO 1819. It is recommended that such doors be constructed or arranged in such a way that the product being handled can be easily extracted after opening them — their release must not be instantaneous and they must comply with ISO 1819.

**4.6.3.1.2** Whenever materials of a noxious character are to be handled, the elevator casing shall be sealed and where necessary fume and dust extraction equipment shall be provided. Air inlet apertures shall also be provided when fume and dust extraction equipment is to be used.

**4.6.3.1.3** As permitted by rule 2.1.4 of ISO 1819, a safety device is not compulsory when the design load of material on the ascending strand is below 300 kg and the vertical distance between chain-wheel shaft centres is below 5 m.

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

**4.6.3.2.1** As required by rule 2.1.7 of ISO 1819, particular care shall be exercised in guarding non-enclosed bucket elevators.

**4.6.3.2.2** For non-cased bucket elevators, the areas where materials may normally be expected to fall shall be provided with protective devices, or access to such areas shall be prevented.

**4.6.3.3** During the utilization stage (operating and maintenance)

**4.6.3.3.1** There shall be regular inspection, adjustment and maintenance of the tension device, in order to avoid scraping of the boot by buckets, and the dangers that may result.

**4.7 Scraper conveyors and "en masse" conveyors**

**4.7.1 Field of application**

**4.7.1.1** These special safety rules apply to conveyors described as follows :

a) Scraper conveyors and drag bar feeders

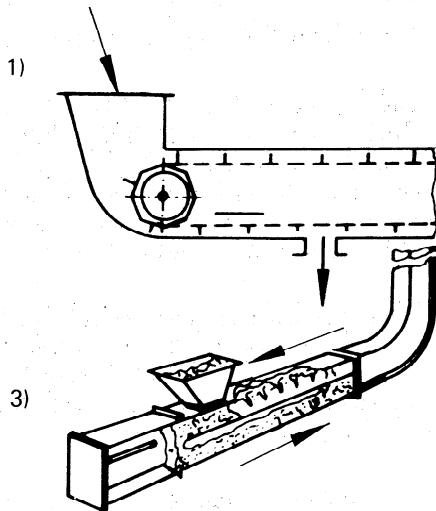
Conveyors for loose bulk materials with one or more endless chains as the driving medium equipped with scraper bars pushing the material in a trough shaped casing.

b) "En masse" conveyors

Conveyors for loose bulk materials with a chain as the driving medium having attached flights or scraper flights moving the material "en masse" in an enclosing trough.

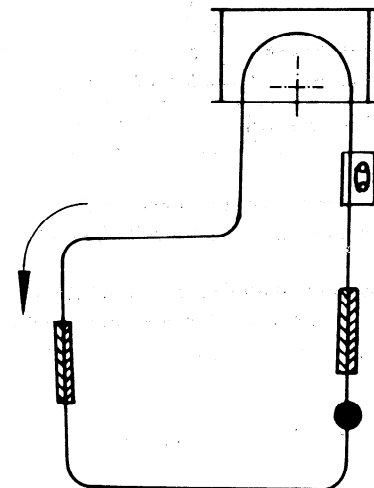


4.7.1.2 Sketch



Conveyors for unit loads with a single strand chain or wire rope in a trench just under or above floor level as the driving medium, and load-carrying trucks connected to this by means of a dog.

4.8.1.2 Sketch



4.7.1.3 Examples

Title	No. from ISO 2148
1) Scraper conveyors	2.14.09
2) Drag bar feeders	2.13.03
3) "En masse" conveyors	2.14.10

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4.7.2 General rules

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

4.7.3 Special safety rules

4.7.3.1 During the installation stage (layout, erection and entry into service)

4.7.3.1.1 The casing shall be erected with great care in order to be effectively sealed having regard to the material being conveyed.

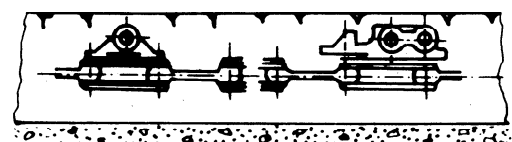
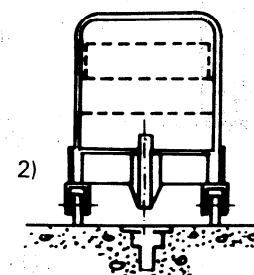
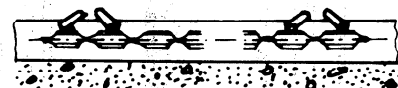
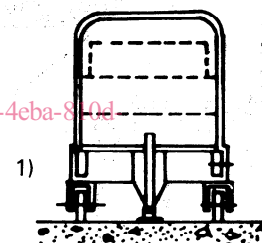
4.7.3.2 During the utilization stage (operation and maintenance)

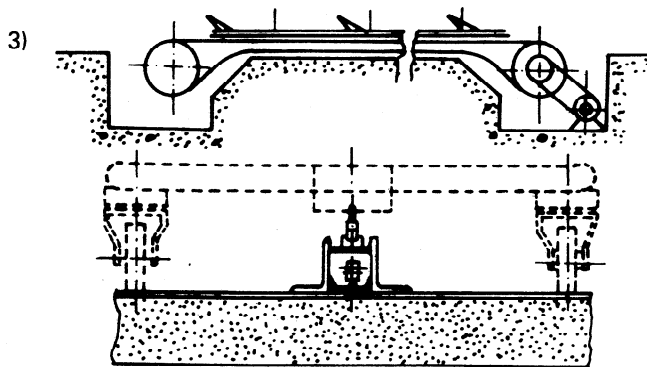
4.7.3.2.1 Access to the moving parts of the appliance is prohibited. If work has to be carried out in the machine in motion, it must have been designed with this in view, and a second person, well acquainted with the actions to be taken in case of emergency, must keep watch on the person at work, and hold himself close to and ready to operate a stop device.

4.8 Single strand floor truck conveyors

4.8.1 Field of application

4.8.1.1 These special safety rules apply to conveyors described as follows :





**4.8.1.3 Examples**

Title	No. from ISO 2148
1) Single strand floor mounted truck conveyors (chain above floor)	2.21.131
2) Single strand floor mounted truck conveyors (chain below floor)	2.21.132
3) Over and under single strand floor truck conveyors (chain above floor)	2.21.135

**4.8.2 General rules**

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

**4.8.3 Special safety rules**

**4.8.3.1 In the construction stage (design and manufacture)**

**4.8.3.1.1** All traction mechanism drives (main sections and branch lines) shall be equipped with load limiters (with or without motor cut-out), which respond when the permissible traction force is exceeded, i.e. independently of the overload safety devices of the electrical switchgear.

**4.8.3.1.2** If several drives operate in one group, the entire group shall be cut out when the load limiter of one drive operates.

**4.8.3.1.3** On all floors of conveyors with chains below floor level accessible to personnel, the working slot shall not be wider than 30 mm.

**4.8.3.1.4** Push dogs moving above floor level shall be of minimum height compatible with reliable engagement with the trucks under all normal working conditions.

**4.8.3.1.5** On all inclined sections where runaway can occur in service, accidental disengagement of the trucks shall be prevented by means of safety devices.

**4.8.3.1.6** If any manufacturing or assembling work is carried out on trucks while they are in motion, suitable guards shall be provided to safeguard personnel (for instance, floor mounted toe-guards, or skirtings or guards mounted on the trucks).

**4.8.3.1.7** Where, for trucks other than those used for manufacturing and assembly work, it is obvious from the operating conditions that dangerous circumstances can arise from a moving truck striking a person or object, a suitable device shall be provided to disengage the truck from the towing medium. This item shall be the subject of agreement between the manufacturer and the user.

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

**4.8.3.2.1** When dogs or chains are above floor level, the path of the chain shall be painted conspicuously in a standard pattern.

**4.8.3.2.2** The chain channel cover must be laid flush with the floor.

**4.8.3.2.3** The vehicles shall be painted conspicuously in a standard pattern.

**4.8.3.2.4** The tracks (transport routes) should be indicated on the floor by stripes of paint of a standard colour, the width corresponding to the overall width of loaded trucks.

**4.8.3.3** During the utilization stage (operation and maintenance)

**4.8.3.3.1** Precise instructions to the operating personnel concerning the loading of the trucks, especially as regards maximum load, equilibrium and maximum dimensions, should be displayed in an easily visible position, on each truck if necessary. Loading gauges should be used, as necessary, for checking.

**4.8.3.3.2** Personnel must be given strict instructions as regards their movement and be prohibited from stopping on the inclined sections and connected low lying zones.

**4.8.3.3.3** Heavy vehicles must not be allowed to pass over the cover plates above the conveyor parts laid below floor-level, unless the cover plates are designed to withstand loads of this type; in this case, a notice showing the maximum dimensions of such vehicles, their maximum load and speed etc must be displayed.

**4.8.3.3.4** It is forbidden for personnel to disengage the trucks when they are on a slope.

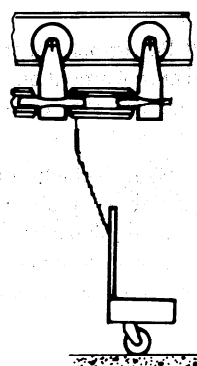
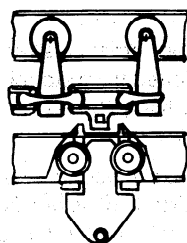
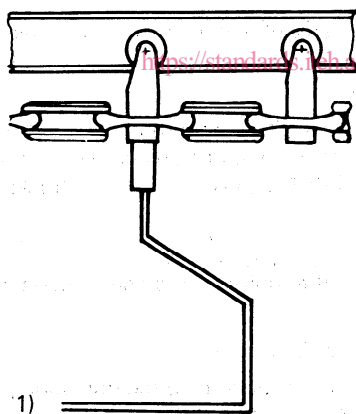
**4.9 Overhead conveyors**

**4.9.1 Field of application**

4.9.1.1 These special safety rules apply to conveyors described as follows :

- a) Conveyors for unit loads, with an endless driving medium (chain or cable) and a series of trolleys supported by an overhead track.
- b) Overhead monorail conveyors : the loads are carried from the trolleys which are permanently linked to the driving medium.
- c) Overhead twin rail conveyors (*power and free*) : the load carrying trolleys run on a separate track and are driven by pusher dogs fixed in the driving medium. The trolleys can be diverted away from the driving medium.
- d) Overhead mono-rail towing conveyor : load carrying floor trucks are attached to the trolleys of the driving medium by a towing mast or chains.

**4.9.1.2 Sketch**



**4.9.1.3 Examples**

Title	No. from ISO 2148
1) Overhead monorail chain conveyors	2.21.081
2) Overhead twin rail chain conveyors ( <i>power and free</i> )	2.21.083
3) Overhead monorail chain conveyors towing floor trucks	2.21.082

**4.9.2 General rules**

The following special safety rules apply in addition to the general rules laid down in ISO 1819.

**4.9.3 Special safety rules**

**4.9.3.1 In the construction stage (design and manufacture)**

4.9.3.1.1 All traction mechanism drives shall be equipped with load limiters (with or without motor cut-out) i.e. independently of the thermal cut-out devices of the electrical switchgear.

4.9.3.1.2 If several drives operate in one group, the entire group shall be cut out when the load limiter of one drive

4.9.3.1.3 Swing trays, hangers and load carrying trolleys must be connected to each other and to the driving medium in such a way that they cannot become detached.

4.9.3.1.4 The driving medium and the load carrying trolleys of the overhead twin rail conveyor must be so designed as to ensure automatic transport even on inclined conveying sections.

4.9.3.1.5 Breaks in the rail at points (hoisting, switching equipment, etc.) must be fitted with safety devices to prevent the load carriers from dropping off.

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

4.9.3.2.1 Chain or roller tracks less than 2,50 m from the ground must be guarded in zones which are accessible to personnel under normal working conditions.

4.9.3.2.2 In addition to rule 2.2.8 of ISO 1819, attention must be drawn by a visual signal at all authorized passages to the danger of a possible collision with a moving load.

4.9.3.2.3 Where the track is inclined, measures shall be taken to prevent both the loads and the carriers becoming uncontrollable.

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