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INTERNATIONAL STANDARD



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## Continuous mechanical handling equipment for loose bulk materials – Storage equipment fed by a pneumatic handling system – Safety code

*Engins de manutention continue pour produits en vrac – Équipements de stockage alimentés par manutention pneumatique – Code de sécurité*

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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 5029 was developed by Technical Committee ISO/TC 101, *Continuous mechanical handling equipment*, and was circulated to the member bodies in February 1976.

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

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

No member body expressed disapproval of the document.

# Continuous mechanical handling equipment for loose bulk materials – Storage equipment fed by a pneumatic handling system – Safety code

## 1 SCOPE

This International Standard specifies, in addition to the general safety rules set out in ISO 1819, the special safety rules for storage equipment for loose bulk materials fed by a pneumatic handling system.

- the principles laid down in clause 1 of ISO 1819;
- the general rules laid down in clause 2 of ISO 1819 and in ISO 5028;
- the following special rules.

## 2 FIELD OF APPLICATION

The safety rules laid down in this International Standard apply regardless of the use for which the equipment is intended. These safety rules limit the supplier's responsibility to continuous mechanical handling equipment properly so called, excluding the structures to which such equipment is fixed.

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

### 4.1.1 Bins, bunkers, silos and hoppers

4.1.1.1 The components must be so designed as not only to carry the stipulated loads (dead weights, stored material, ancillary superstructures, occasional overloads, etc. and if necessary climatic overloads) but also to withstand the maximum permissible pressure or vacuum.

4.1.1.2 When feeding is by blowing, if the permissible pressure in the storage receptacles is lower than the maximum pressure which may be supplied by the installation, the components should be equipped with appropriate devices allowing the rapid discharge of the whole of the conveying air when the pressure rises to a value which is higher than the permissible pressure.

4.1.1.3 When feeding is by suction, if the permissible vacuum in the storage receptacles is less than the maximum possible vacuum which may be created by the installation, the components shall be equipped accordingly so as to prevent the increase of the vacuum beyond the permissible limit.

4.1.1.4 Stability under all load conditions must be ensured.

## 3 REFERENCES

ISO 1819, *Continuous mechanical handling equipment – Safety code – General rules*.<sup>1)</sup>

ISO 5028, *Continuous mechanical handling equipment for loose bulk materials – Pneumatic handling installations – Safety code*.

## 4 SPECIAL SAFETY RULES

The construction and operation of storage equipment for loose bulk materials fed by a pneumatic handling system shall meet

- the legal and local requirements relating to safety in general (see appendix Z of ISO 1819);
- the design rules for containers under pressure not submitted to the action of flame;<sup>2)</sup>

1) At present at the stage of draft. (Revision of ISO/R 1819-1970.)

2) See the corresponding national regulations.

**4.1.1.5** If the material stored is reclaimed by vehicles or other moving equipment, the following minimum clearances must be left between the supporting structures and the vehicles or other moving equipment :

- 0,5 m for any fixed isolated obstacle less than 0,3 m wide as measured in the direction of the movement of the equipment (post, pile, column, angle of building, etc.);
- 0,7 m for a fixed continuous obstacle (wall, warehouse, wharf, building, etc.).

**4.1.1.6** According to the nature of the product, the design of storage receptacles, particularly the slopes of the walls and the position and size of discharge openings, must be such as to ensure a satisfactory flow of the product by gravity, with or without the help of auxiliary equipment. In particular, storage equipment for materials which could form vaults shall be provided with equipment for breaking the latter.

Interior struts, interior ladders and other interior components must be avoided to the greatest possible extent.

**4.1.1.7** Bins, bunkers, silos and hoppers intended for use with dry combustible materials must be constructed of fireproof materials.

**4.1.1.8** When bins, bunkers, silos and hoppers are more than 1,50 m deep, risk of workers being buried under products or sinking into them must be prevented and, in particular, inspection doors and detachable parts of bins, bunkers, silos and hoppers must be fitted with a lock and key enabling them to be locked.

#### **4.1.2 Bin gates**

Bin gates shall be so designed as to ensure satisfactory tightness for the material considered.

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

#### **4.2.1 Bins, bunkers, silos and hoppers**

**4.2.1.1** Arrangements must be made to stop feeding bins, bunkers, silos and hoppers when the maximum capacity is reached.

**4.2.1.2** If there are any hazards of fire or explosion due to the presence of gas, dust or dangerous mixtures, auxiliary installations (lighting, etc.) shall comply with the rules covering such hazards.

**4.2.1.3** In order to ensure compliance with the requirements of rule 4.1.1.5, the following provisions should be made :

- a) if the equipment travels on fixed tracks, these tracks should be laid to provide the required minimum clearances;
- b) where steerable vehicles are used, special devices such as bollards, island plinths or continuous curbs should be provided to meet these requirements.

**4.2.1.4** The discharge of material and gas from the safety devices must be made to areas not easily accessible to operating personnel.

#### **4.2.2 Bin gates**

Bin gate controls, whether manually or mechanically operated, shall be easily accessible, remote from any hazard of material, and also remote from traffic lanes.

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

**4.3.1** Bins, bunkers, silos and hoppers must not be used for storing materials the characteristics of which are different from those of the products for which they are designed, without the manufacturer's consent.

**4.3.2** Access to the inside of bins, bunkers, silos and hoppers should be prohibited and notice of this prohibition should be prominently displayed.

Where it is necessary for personnel to enter the bins, bunkers, silos and hoppers, special precautions should be taken, including the use of safety equipment, and the individual entering the equipment should be under continuous observation; notices to this effect should be prominently displayed.

In all cases where keys are provided, they should be held by the responsible person.

**4.3.3** The working order of the safety devices controlling the pressure and vacuum (safety valves, bursting disks, etc.) shall be regularly checked.

**4.3.4** When feeding is by blowing and when there is a filter on the air exhaust, the amount of clogging of the filter must be regularly checked so that the resulting increase of pressure will not lead to an unacceptable overpressure in the bunker or silo.