UDC 621.867 : 614.8

Ref. No. : ISO/R 1820-1970 (E)

ISO

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1820

CONTINUOUS MECHANICAL HANDLING EQUIPMENT FOR LOOSE BULK MATERIALS

STORAGE EQUIPMENT : STORAGE BINS AND BUNKERS, SILOS AND HOPPERS, BIN GATES

SAFETY CODE

1st EDITION

August 1970

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1820, *Continuous mechanical handling equipment for loose bulk materials – Storage equipment : Storage bins and bunkers, silos and hoppers, bin gates – Safety code,* was drawn up by Technical Committee ISO/TC 101, *Continuous mechanical handling equipment,* the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question led to the adoption of Draft ISO Recommendation No. 1820, which was circulated to all the ISO Member Bodies for enquiry in April 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Greece	Peru
Belgium	Israel	Poland
Canada	Italy	South Africa, Rep. of
Czechoslovakia	Japan	Sweden
Finland	Korea, Rep. of	U.A.R.
France	New Zealand	United Kingdom
Germany	Norway	U.S.S.R.

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 1820 | August 1970

CONTINUOUS MECHANICAL HANDLING EQUIPMENT FOR LOOSE BULK MATERIALS

STORAGE EQUIPMENT : STORAGE BINS AND BUNKERS, SILOS AND HOPPERS, BIN GATES SAFETY CODE

1. SCOPE

This ISO Recommendation specifies, in addition to the general safety rules set out in ISO Recommendation R 1819, *Continuous mechanical handling equipment – Safety code – General rules*, the special safety rules for the following continuous mechanical handling equipment for loose bulk materials : storage equipment such as storage bins and bunkers, silos and hoppers, bin gates.

2. FIELD OF APPLICATION

The safety rules laid down in this ISO Recommendation apply 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 to which such equipment is affixed.

3. SPECIAL SAFETY RULES

The construction and operation of storage equipment such as storage bins and bunkers, silos and hoppers, bin gates, should meet

- the legal and local requirements relating to safety in general*,
- the principles laid down in section 1 of ISO Recommendation R 1819,
- the general rules laid down in section 2 of ISO Recommendation R 1819,
- the following special rules :

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

3.1.1 *Bins and bunkers, silos and hoppers*

3.1.1.1 GENERAL

3.1.1.1.1 The components should be designed to bear the stipulated loads : dead weights, material stored, ancillary superstructures, occasional overloads and climatic overloads if any.

3.1.1.1.2 Stability under all load conditions should be ensured.

* See Appendix Z of ISO Recommendation R 1819.

3.1.1.1.3 If the material stored is reclaimed by vehicles or other moving equipment the following minimum free passages should be left between the supporting structures and the vehicles or other moving equipment :

– 500 mm in the case of a stationary isolated obstacle (post, pile, column, angle of building, etc, less than 300 mm wide, as measured in the direction of movement of equipment);

– 700 mm in the case of a stationary continuous obstacle (wall, warehouse, platform or wharf, building etc.).

3.1.1.1.4 According to the nature of products, the design of bins and bunkers, silos and hoppers, particularly the slopes of the walls, the position and size of discharge openings, should be such as to ensure satisfactory flow of the product by gravity with or without the help of ancillary means.

Interior struts, interior ladders and other internal fittings should be avoided as far as possible.

3.1.1.1.5 Bins and bunkers, silos and hoppers intended for use with dry combustible materials should be constructed of fireproof materials.

NOTE. – The above-mentioned rules apply to all bins and bunkers, silos and hoppers. When the latter are more than 1500 mm deep, risks of workers being buried under products or sinking into them should be prevented and, in particular, the following complementary rules are to be applied :

3.1.1.2 CLOSED BINS AND BUNKERS, SILOS AND HOPPERS

3.1.1.2.1 Inspection doors and detachable parts of closed bins and bunkers, silos and hoppers should be fitted with a device enabling them to be locked with a key.

3.1.1.2.2 Whenever the nature of the material or the feeding method tends to increase the pressure in bins and bunkers or silos and hoppers, a decompression device should be provided.

3.1.1.3 OPEN BINS AND BUNKERS, SILOS AND HOPPERS

3.1.1.3.1 Unless it is technically impossible, the upper opening of open bins and bunkers, silos and hoppers should be protected by a horizontal or vertical guard.

In many cases a horizontal guard is used consisting either of a grid of bars or of a rigid wire screen completely covering the upper opening. Where the horizontal guard is the only protection, the spacing between the bars of a grid should not exceed 70 mm, and the mesh of a rigid wire screen should not exceed 200 mm × 200 mm.

In all other cases, a vertical barrier should be provided consisting of a guard rail extending above the walls of the bin and bunker, or silo and hopper. This guard rail should be at least 1000 mm high and provided with an additional protection such as a protective wire screen; the smooth wall system can be resorted to, if necessary.

3.1.1.3.2 Inspection doors, detachable parts and openings in the above-mentioned barriers should, as in the case of closed silos, be fitted with a device enabling them to be locked with a key.

3.1.1.3.3 Rules 3.1.1.3.1 and 3.1.1.3.2 are also applicable to bins and bunkers, silos and hoppers partially opened; for example, this is the case when feeding is carried out by mobile conveyors (shuttle conveyors) or by travelling tripper.

3.1.2 *Bin gates*

3.1.2.1 According to the nature of products, bin gates should be so designed as to ensure satisfactory flow of the material and discharge by gravity.