SLOVENSKI STANDARD
SIST ISO/TR 5045:1996

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Naprave in sistemi za kontinuirni transport - Varnostni predpis za tračne transporterje - Primeri zaščite kritičnih mest

Continuous mechanical handling equipment -- Safety code for belt conveyors -- Examples for guarding of nip points

Engins de manutention continue -- Code de sécurité des transporteurs à courroie -- Exemples de protection aux points d'enroulement

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ICS:

53.040.10 Transporterji Conveyors

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TECHNICAL REPORT 5045

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

Continuous mechanical handling equipment — Safety code for belt conveyors — Examples for guarding of nip points

Engins de manutention continue — Code de sécurité des transporteurs à courroie — Exemples de protection aux points d'enroulement

Technical Report 5045 was drawn up by Technical Committee ISO/TC 101, *Continuous mechanical handling equipment*, and approved by the majority of its members. The reasons which led to the publication of this document in the form of a Technical Report are given below.

The aim of this Technical Report is to give examples for safety at nip points between belts and pulleys and between belts and idlers for all belt conveyors.

This Technical Report incorporates sketches which show in principle how sufficient safety can be achieved, without excluding other methods which give the same safety factor. As this is a subject that cannot be considered as suitable for an International Standard, it was decided to publish the document as a Technical Report.

1 SCOPE AND FIELD OF APPLICATION

This Technical Report describes safety techniques for guarding the dangerous nip points of belt conveyors, which occur between the belt and its pulleys or idlers.

It supplements the various International Standards dealing with safety of continuous mechanical handling equipment. (See, in particular ISO 1819 and ISO 1821. Nomenclature of equipment is given in ISO 2148.)

2 REFERENCES

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

ISO 1821, *Continuous mechanical handling equipment for loose bulk materials — Belt feeders and conveyors — Safety code.*

ISO 2148, *Continuous handling equipment — Nomenclature.*

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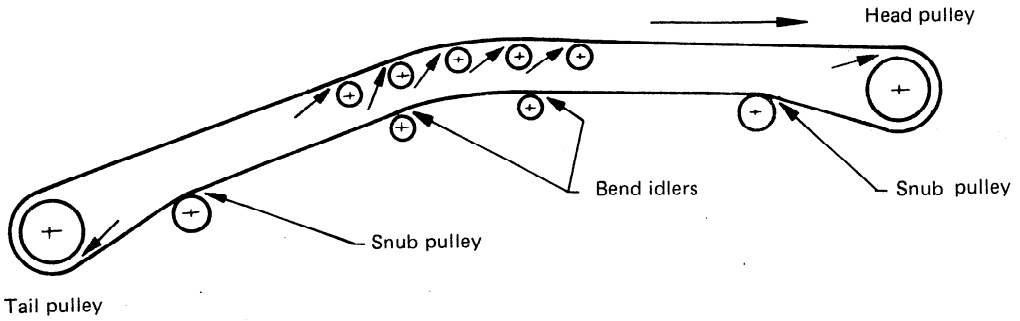
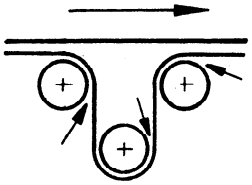
3 DANGEROUS NIP POINTS

3.1 The most dangerous nip points on belt conveyors occur when the belt is reversed or deflected. Typical examples are shown in the following illustration.

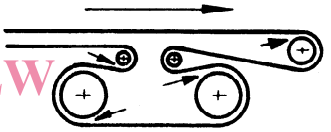


3.2 When there are additional reversal or deflection points on individual sections of the conveyor, the nip points to be guarded are typically as shown below.



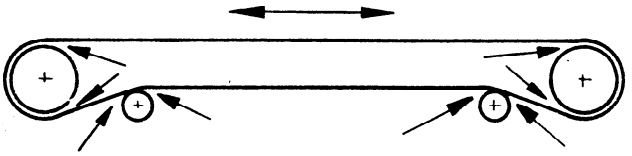
Gravity tension gear

Extended throw-off



Double pulley drive

3.3 Reversible belts have additional danger points, namely, the in-running nips which were previously run-off points of the pulleys; these points are shown in the illustration below.



4 SAFETY MEASURES FOR BELT PULLEYS

Intakes between the belt and pulley are very dangerous, owing to the considerable forces exerted, and the arc of contact of the belt of 180° or more. Operating conditions, and the method of tensioning, must be taken into account when designing guards, which should prevent all access to the intake.

4.1 Direct safety measures for the nip point

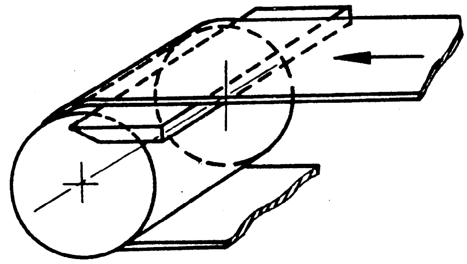
If the type of material conveyed permits, it is preferable to insert devices at the danger point, since the devices protect the danger point directly. They also permit good visual inspection during operation and need not be removed during repair and maintenance work.

Complete protection is given only when the leading edge is carefully designed, undeformable, and entered as deeply as possible into the nip point.

Guards of solid section may not be used with rod or mesh belts where the mesh aperture or the rod spacing exceeds 10 mm, nor may they be used with bar or cage pulleys in reversible conveyors. For non-reversible conveyors, such solid section guards made from formed sheet as in 4.1.2 are suitable for use with bar or cage pulleys (see also 4.4.2).

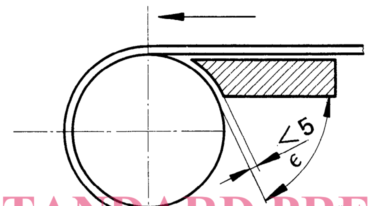
4.1.1 *Solid packing material guards*

These are especially suitable when transporting unit loads, since the delivery point is easily accessible.

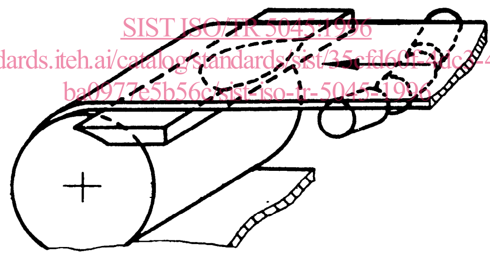


They are only suitable when the pulley periphery is smooth and complete.

The angle ϵ must be greater than 45° for a smooth pulley and greater than 60° for a coated pulley since otherwise there is a danger of an intake on the lower side of these guards. This can be avoided by using a guard of the appropriate shape or by adding a strengthener of triangular section.

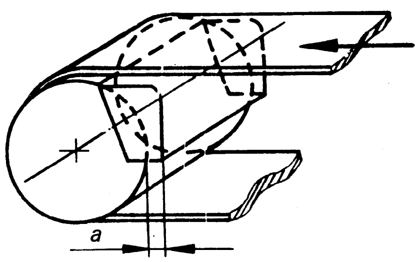


It is possible to make the guard suit a troughed belt conveyor by reducing the length of the guard or by appropriately shaping its upper side.



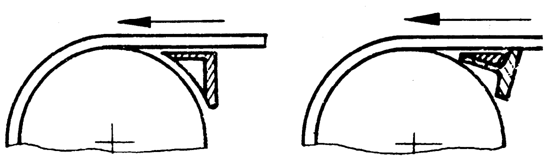
4.1.2 *Sheet metal guards*

These must have reinforcing side pieces carried around the edge of the pulley. For bar cage pulleys the distance *a* must be greater than 80 mm.



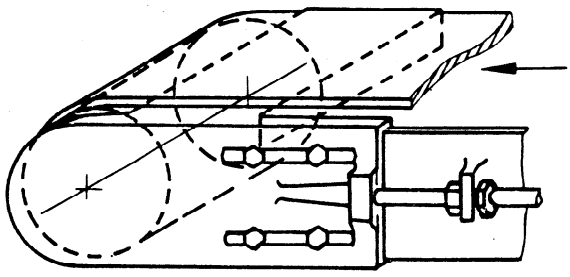
4.1.3 *M. S. sections of adequate dimensions*

These may be positioned at the in-running nip and with the inside angle filled or covered with sheet shaped to the pulley surface. T-sections can be easily adapted for this arrangement.



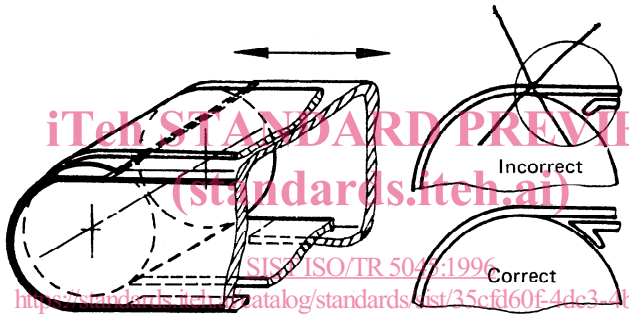
4.2 Enclosed tension gear

This consists of a sheet metal guard integral with the side guards which themselves include the pulley bearing guards : all the edges are rounded. No re-adjustment is required after tensioning the belt.

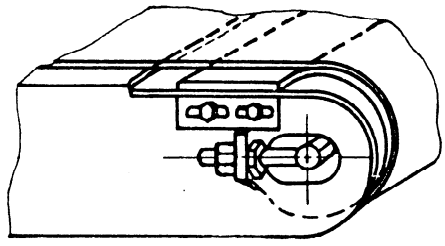


4.3 Sliding surfaces

In the box-shaped conveyor frame made from standard materials, the sliding surface is pushed forward as far as the nip point. Where edge reinforcement is required, it is recommended that the edges are flanged by stamping, and not folded through an obtuse angle (see illustration).



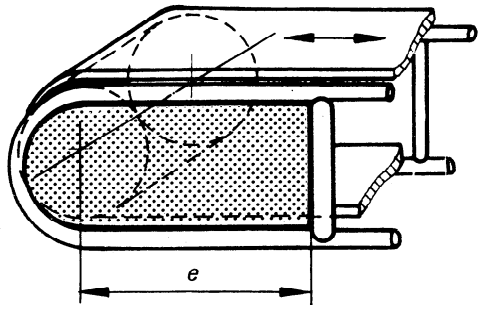
At take-up pulleys, part of the sliding surface should be arranged so that it can be adjusted.



4.4 Protective cladding between the stringer rails

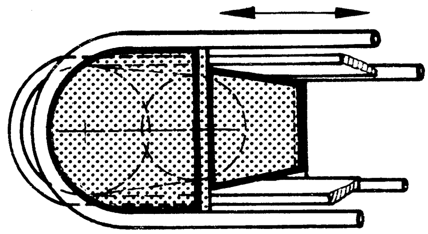
4.4.1 *Side covers between upper and lower stringers with rounded or flanged edges*

The distance between the rear vertical edge of the guard and the pulley axis should not be less than the value *e* given in table 1 (see annex), which sets out minimum values for various diameters.



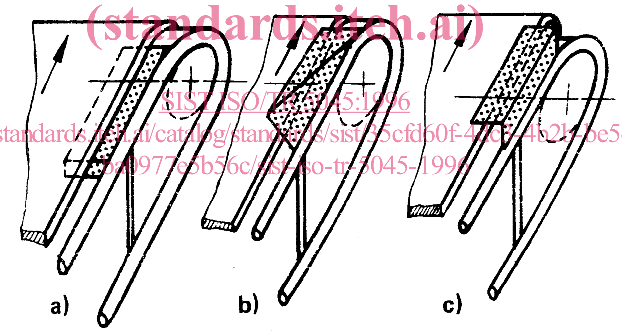
4.4.2 *Short side panels with a transverse panel which occupies the space between the two strands of belt*

These are recommended for the protection of pulleys of cage or spiral construction.



4.4.3 *Guards on the upper side*

In addition to the side guards described in 4.4.1 and 4.4.2, guards on the upper side are necessary if there is a possibility of access to the nip point over the stringer. There must be no carrying idlers beneath the guards shown in b) and c). These types are unsuitable for conveyors carrying unit loads.

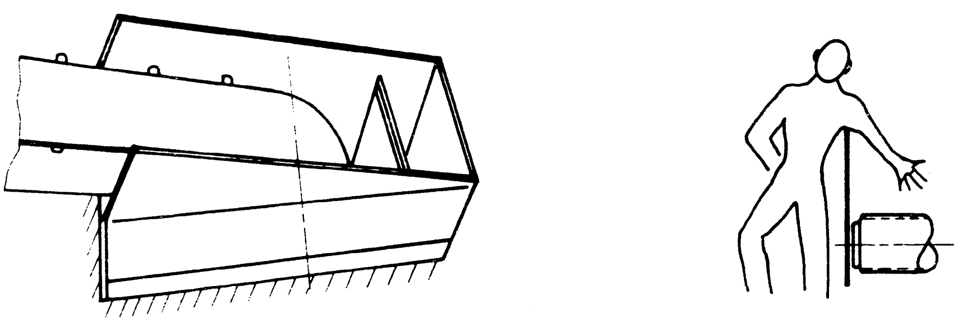


a) b) c)

4.4.4 *Guards preventing access from the side or from above*

The shape of the guard edges and the distance between the rear vertical edge of the guard and the pulley axis must comply with 4.4.1.

The distances for the prevention of access from above are set out in table 2 (see annex).

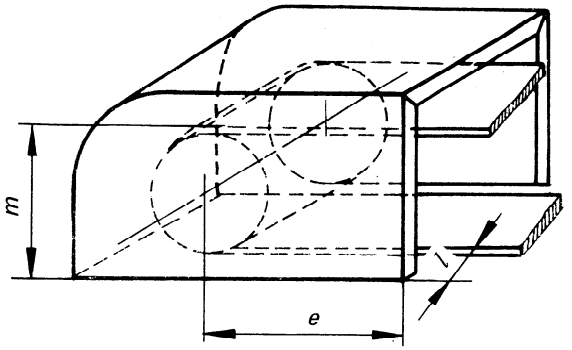


4.5 Protective casings

4.5.1 *Cover hoods of sheet or mesh*

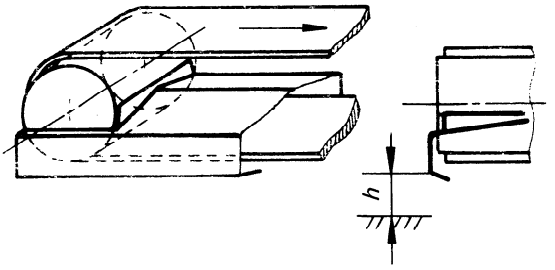
The distance between the edge of the hood and the pulley axis should not be less than the value *e* given in table 1.

The distance *l* between the conveyor belt edge and cover hood should not exceed 80 mm; otherwise the distance *m* from the lower edge of the hood to the nip point should be approximately 800 mm. Sharp edges should be avoided.



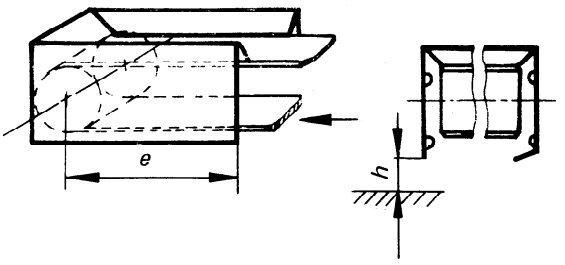
4.5.2 *Fixed guard over the lower belt strand as far as the pulley skirt, also preventing access to the lower nip point*

The minimum length of the guard measured from the pulley axis must not be less than the value *e* given in table 1. The end of the guard should be turned upwards to be in close proximity to the pulley skirt. In the case of portable or mobile conveyors, and in any other conveyor where *h* exceeds 300 mm above the floor, the lower part of the guard should be flanged inwards to prevent access to the nip.



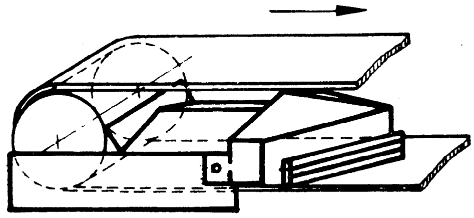
4.5.3 *Feed hoppers with side walls bolted to the conveyor frame*

The distance from the pulley axis to the front of the side walls should not be less than the value *e* given in table 1. If the dimension *h* exceeds 300 mm above the floor, then the lower belt strand should be guarded (for example by the method already shown in 4.5.2).



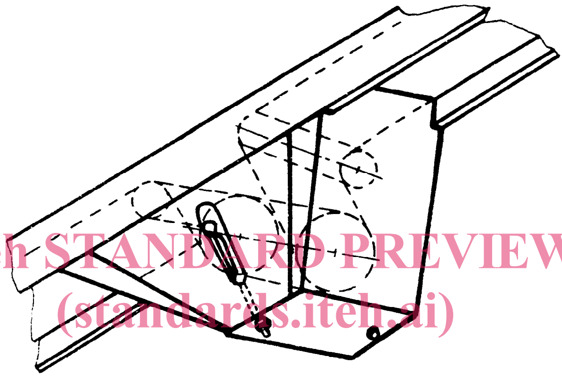
4.5.4 *Guard covering the return strand incorporating a belt scraper*

The fixed portion of the guard should comply with 4.5.2.



4.6 Total enclosure of pulley systems particularly for take-up gear

4.6.1 *Hood fastened to the fixed part of the take-up pulley guide*



4.6.2 *Guarding of a complete gravity take-up by a framework with sheet or wire mesh*

In the sketch, the following points are dealt with :

a) mesh protection preventing the insertion of the hand;

b) take-up pulley guide;

c) sweeping clearance *C* of 225 mm, or a lockable access door;

d) guide for the take-up weight;

e) take-up weight travel limiter.