TECHNICAL REPORT 5046

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Continuous mechanical handling equipment — Safety code for conveyors and elevators with chain-elements — Examples for guarding of nip points

Engins de manutention continue — Code de sécurité des appareils à chaînes — Exemples de protection des points d'engrènement

Technical Report 5046 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 the following :

The aim of this Technical Report is to give examples for the guarding of nip points between the chains and the sprocket wheels or caterpillar drives for all conveyors and elevators using chains as transporting elements.

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 different safety devices at nip points for conveyors and elevators with chain-elements. It supplements the various International Standards dealing with safety of continuous mechanical handling equipment.

2 REFERENCE

ISO 1819, *Continuous mechanical handling equipment — Safety code — General rules.*[1)]

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

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Descriptors : handling equipment, continuous handling, conveyors, chain conveyors, elevators, safety equipment, nip points.

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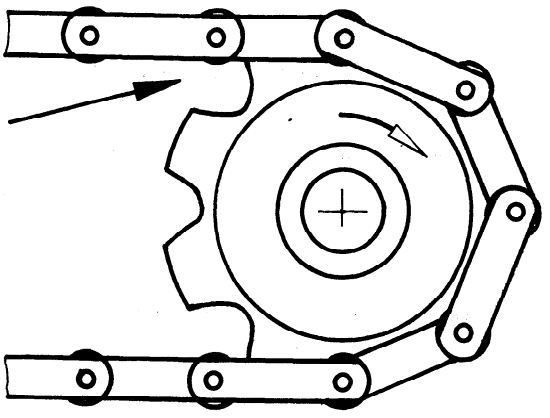
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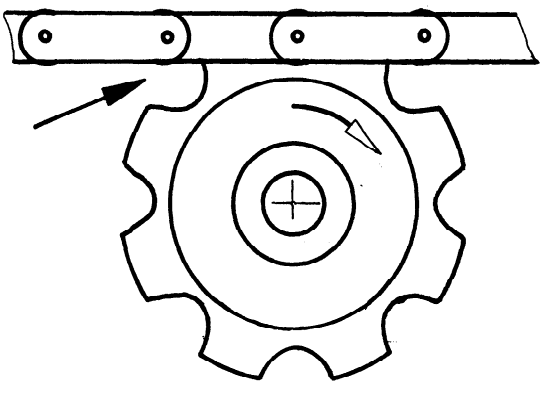
3 NIP POINTS ON CHAIN CONVEYORS

There is a risk of accidents occurring where chains run on to sprocket wheels or guide wheels.

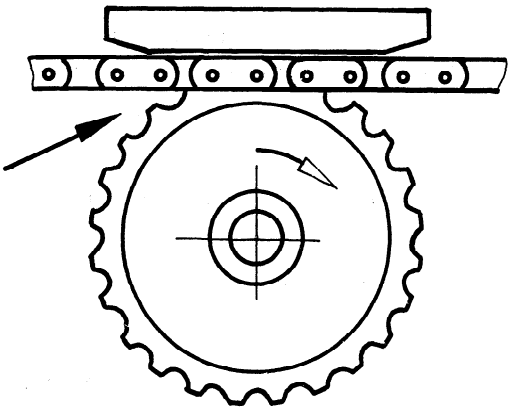
3.1 When the chains run round sprockets.



3.2 When the chain is supported by a sprocket.



3.3 When a shoe above the chain precludes any possibility of the chain lifting.



points to be protected

direction of travel

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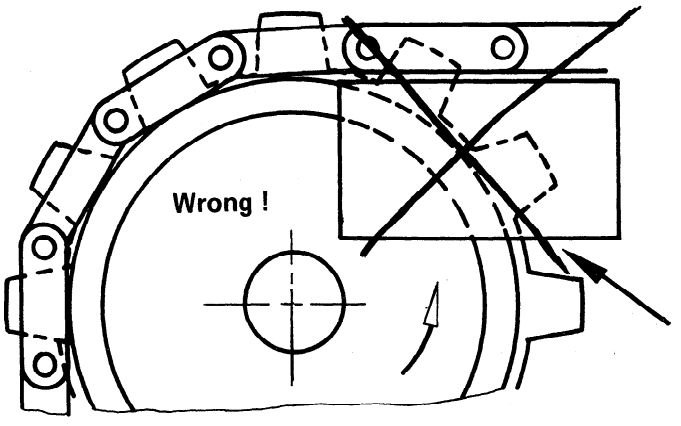
4 BASIC TYPES OF PROTECTING DEVICES

4.1 General requirements

4.1.1 Guards must be shaped in such a way that they do not impede the functioning of the equipment.

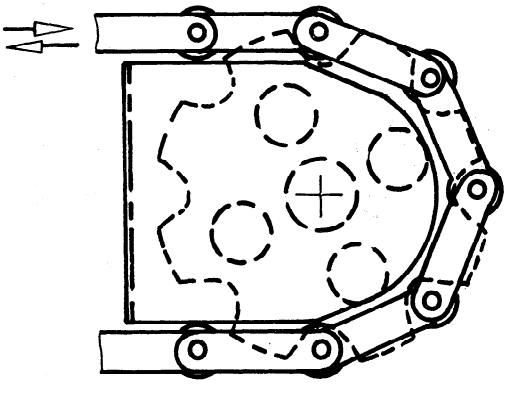
They must cover the dangerous areas completely but should not be larger than necessary, so that the state of maintenance and wear may be seen.

4.1.2 For chain wheels, a plate or a filling block just covering the nip is unsatisfactory, as a shear trap between each tooth and the guard is introduced.

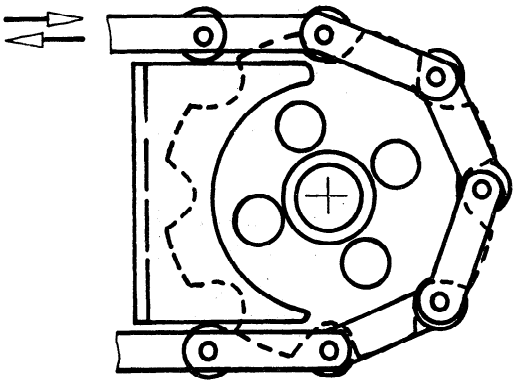


4.1.3 Guards on sprockets with spokes or openings on the disks must be shaped in such a way that no shear points are introduced :

a) by fully covering the wheels;



b) by limiting the guards up to the root radius of the full part of the sprocket where no shear points can arise from the sprocket openings.



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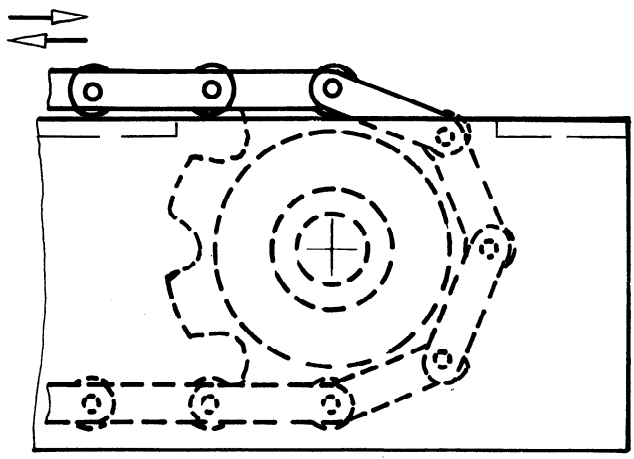
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4.2 Examples of protecting devices

Guarding of nip points may be achieved by means of the following devices :

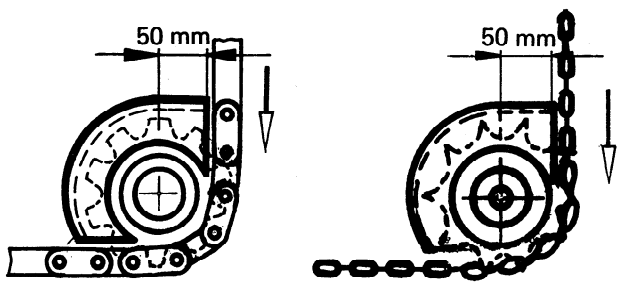
4.2.1 *Structural protection*

Enclosure of the sprocket wheels with the nip points by the machine casing, or under the floor.

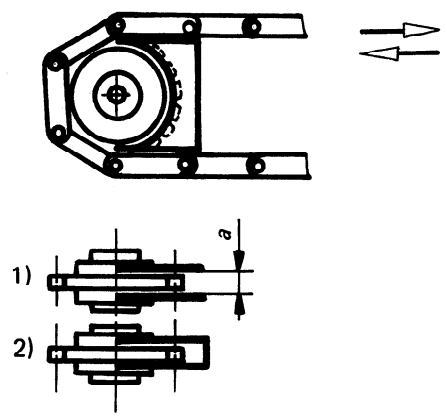


4.2.2 *Guards*

4.2.2.1 Guards extending between the chains up to the root radius of the sprocket wheel, with an extension of at least 50 mm perpendicular to the chain at the entry side.

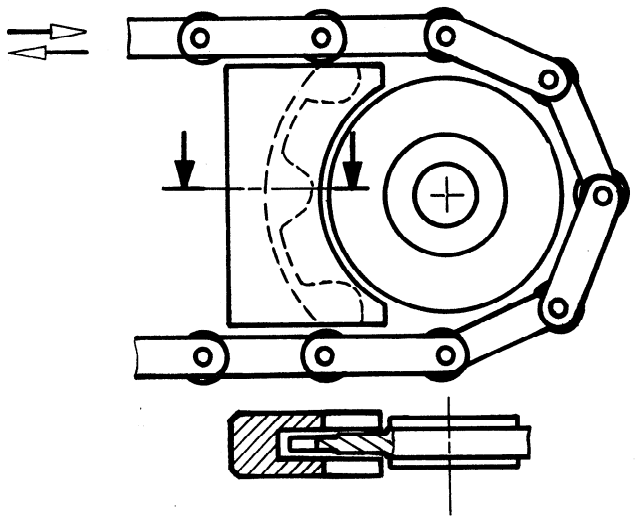


4.2.2.2 Guarding of both sides of the nip points by covers between the strands of chain. If the distance *a* between the covers is greater than 20 mm, the guard should be of a suitable length, or the opening between the sheets filled in (2) to prevent access to the nip points.

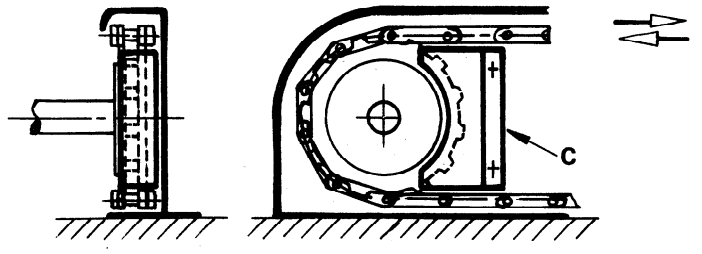


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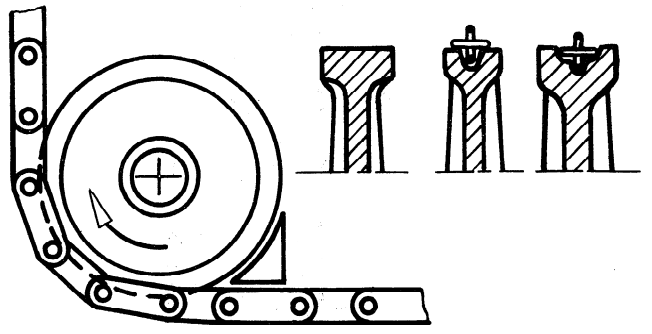
4.2.2.3 A filler block filling the space between the chains and shaped to cover the teeth to the root.



4.2.2.4 A guard outside and above the chain. In the working area an additional internal piece C prevents access to the nip points.



4.2.2.5 A filler block as illustrated may be used with smooth pulleys or grooved pulleys as shown.



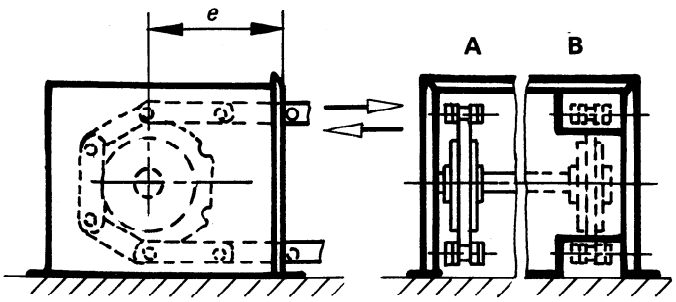
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4.2.3 *Enclosing guards*

4.2.3.1 Enclosing guards of solid material or mesh for horizontal runs of conveyors.

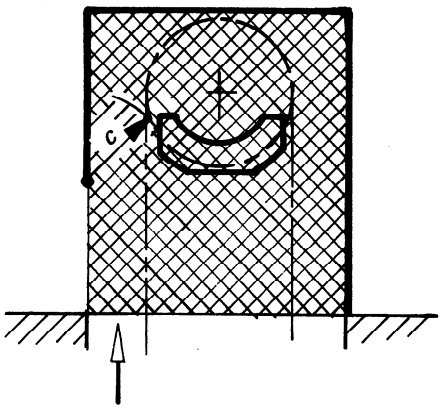
If there are no guards between the chains as shown in A, the distance *e* should not be less than 850 mm. If there are guards between the chains as shown in B the covered length must be such as to prevent access to the nip points.

The height of the guard above the chain depends to a great extent on the construction of the conveyor. Relevant information is to be found in clause 5.

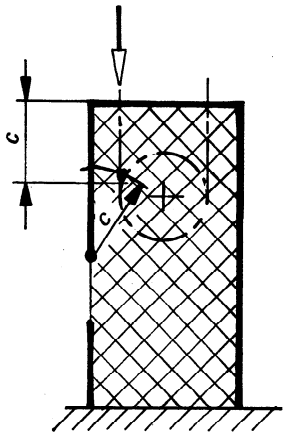


4.2.3.2 Guards for vertical runs of conveyors can be made of solid material or mesh. The guard should prevent access to the nip points. The nip points must not be accessible through loading openings.

If the distance *c* from the upper edge of the opening to the nip point is less than 850 mm, the nip point is to be made safe by internal guards.

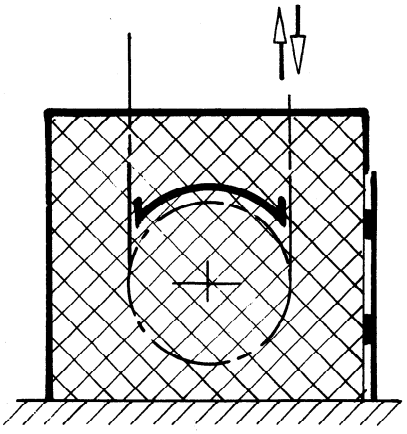


4.2.3.2.1 Guards which prevent access to the nip points from outside. If the guard does not extend 850 mm from the nip point, the nip point should be guarded separately.



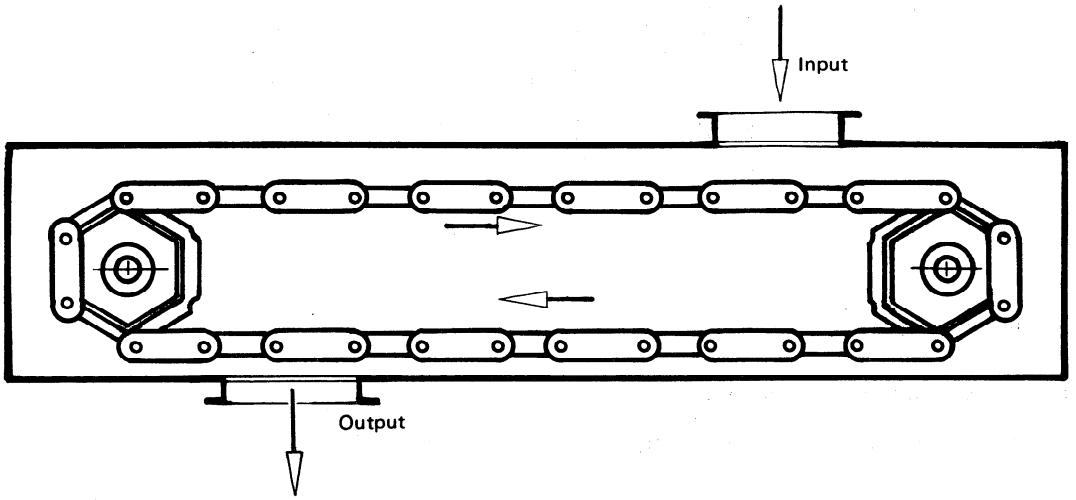
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4.2.3.2.2 If access gates are fitted in the guards, additional guards must be provided to fence any accessible nip point.



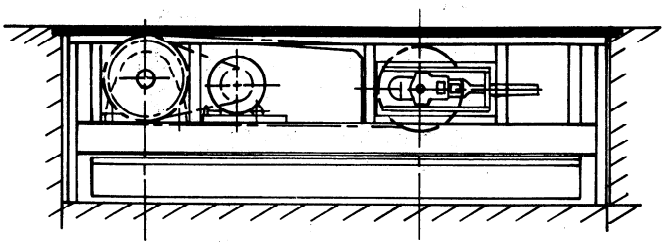
4.2.4 *Enclosed casings*

When nip points are inside an enclosed casing they must not be accessible through the feeding, unloading or control openings.



4.2.5 *Guards common to several nip points*

If the components to be guarded are located under the floor, the guard must conform to the design load of the floor, or traffic must be prohibited.



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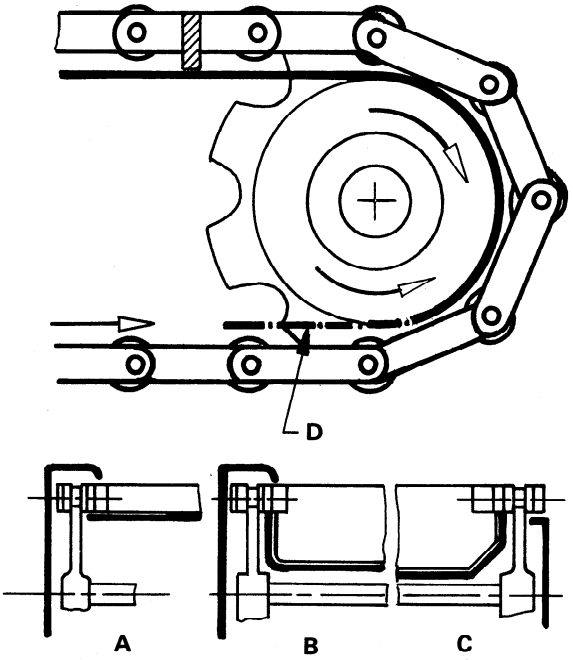
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4.2.6 *Guarding by the bottom plate (flat or troughed) of drag-link, push-plate or flight conveyors*

When the chains are connected with flights and the surfaces under them solidly lined, the plate as shown in A provides the inner guard for the nip point at the delivery end. The shear point between the teeth and the plate should not be accessible. With deep troughs as shown in B and C, the lateral metal plates should be taken up to the chain.

At the loading point, the nip point is located at the underside of the conveyer; hence the plate must be extended to guard it as shown by D.

It is necessary to provide for external protection of the nip point. This guard may enclose the chain as shown in B, or end immediately below it as shown in C.



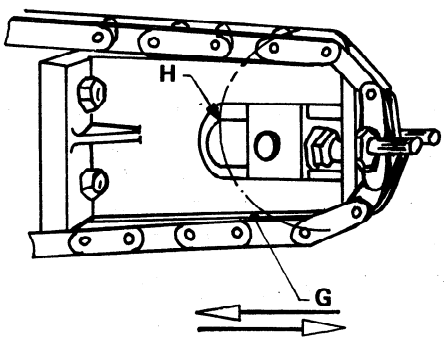
5 EXAMPLES OF GUARDS

5.1 Raised link or offset roller chain conveyors

Nip points of these chain conveyors can be guarded by any of the following methods :

5.1.1 Fixed and sliding bearings, so shaped that the space between the upper strand and lower strand of the chain is filled. It should not be possible to insert a finger between the bearing support and the chain (G).

Ensure that no tooth may cause a shear point between the bearing support and the sprocket wheels in the tensioning area (H).



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