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Replacing GB/T 23821-2009

Safety of Machinery – Safety Distances to Prevent Hazard Zones being Reached by Upper and Lower Limbs

(ISO 13857:2019, IDT)

机械安全 防止上下肢触及危险区的安全距离

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Table of Contents

Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 *Directives for Standardization – Part 1: Rules for the Structure and Drafting of Standardizing Documents*.

This Document replaced GB/T 23821-2009 *Safety of Machinery - Safety Distances to Prevent Hazard Zones being Reached by Upper and Lower Limbs*. Compared with GB/T 23821-2009, the major technical changes of this Document are as follows besides the structural adjustments and editorial modifications:

a) Add the term and definition of "reference plane" (see 3.2 of this Edition);

b) Change the requirements for the risk assessment (4.1.2 of this Edition; 4.1.2 of 2009 Edition);

c) Change the requirements for preventing hazard zones being reached over protective structures (see 4.2.2 of this Edition; 4.2.2 of 2009 Edition);

d) Add the requirements for whole body access to (hazard zones) (see 4.4 of this Edition).

This Document equivalently adopts ISO 13857:2019 *Safety of Machinery – Safety Distances to Prevent Hazard Zones being Reached by Upper and Lower Limbs*. Compared with ISO 13857:2019, this Document made the following editorial modifications:

--- Modify the editorial errors in ISO 13857:2019; change the "height of hazard zone α", "height of protective structure b" and "horizontal safety distance to hazard zone c" in Figures A.1, A.2 and A.3 into "height of the point of the hazard zone which is nearest to the area of upper limb reach h_h", "height of protective structure h_{ps}" and "horizontal safety distance of the pint of the hazard zone which is nearest to the area of upper limb reach s_h", respectively.

Please note some contents of this Document may involve patents. The issuing agency of this Document shall not assume the responsibility to identify these patents.

This Document was proposed by and under the jurisdiction of National Technical Committee on Machinery Safety of Standardization Administration of China (SAC/TC 208).

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Safety of Machinery – Safety Distances to Prevent Hazard Zones being Reached by Upper and Lower Limbs

1 Scope

This document establishes values for safety distances in both industrial and non-industrial environments to prevent machinery hazard zones being reached. The safety distances are appropriate for protective structures. It also gives information about distances to impede free access by the lower limbs (see Annex B).

This document covers people of 14 years and older (the 5th percentile stature of 14-year-olds is approximately 1 400 mm). In addition, for upper limbs only, it provides information for children older than 3 years (the 5th percentile stature of 3-year-olds is approximately 900 mm) where reaching through openings needs to be addressed.

NOTE 1: It is not practical to specify safety distances for all persons. Therefore, the values presented are intended to cover the 95th percentile of the population.

Data for preventing lower limb access for children is not considered in this Document.

The distances apply when sufficient risk reduction can be achieved by distance alone. Because safety distances depend on size, some people of extreme dimensions will still be able to reach hazard zones even when the requirements of this document are met.

Compliance with the requirements in this document will prevent access to the hazard zone. Nevertheless, the user of this document is advised that it does not provide the required risk reduction for every hazard (e.g., hazards related to machine emissions such as ionizing radiation, heat sources, noise, dust).

The clauses covering lower limbs apply on their own only when access by the upper limbs to the same hazard zone is not foreseeable according to the risk assessment.

The safety distances are intended to protect those persons trying to reach hazard zones under the conditions specified (see 4.1.1).

NOTE 2: This document is not intended to provide measures against reaching a hazard zone by climbing over (see GB/T 8196-2018, 5.18).

4 Safety Distances to Prevent Reach or Access by Upper and Lower Limbs

4.1 General

4.1.1 Assumptions

The safety distances in this document have been derived by making the following assumptions:

— the protective structures and any openings in them retain their shape and position;

— safety distances are measured from the surface restricting the body or the relevant part of the body;

— the body is forced over protective structures or through openings in an attempt to reach the hazard zone;

— there is some contact with the reference plane while wearing shoes (use of high-soled shoes, climbing and jumping are not included);

— no aids such as chairs or ladders are used to change the reference plane;

— no aids such as rods or tools are used to extend the natural reach of the upper limbs.

4.1.2 Risk assessment

4.1.2.1 General

Safety distances are determined if the hazard to be considered has been identified as significant (see GB/T 15706-2012, 3.8). All reasonably foreseeable access means shall be taken into account. When the possibility of access or the variety of hazard zones requires the application of more than one table, all safety distances shall be taken into account. When more than one safety distance is determined for the same means of access, the greatest safety distance shall be applied.

The safety distances, s_r, given in Table 7 apply to persons reaching through openings using the lower limbs in an attempt to reach a hazard zone.

4.1.2.2 Selection of safety distances when reaching upwards and reaching over

Prior to selecting a suitable safety distance in case of reaching upwards (see 4.2.1) or reaching over protective structures (see 4.2.2), it is necessary to consider the severity of harm and the probability of occurrence of this harm caused by the hazard.

In case of reaching upwards, the higher value according to 4.2.1.2 shall be applied. In the case

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