Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

Prüfbericht-Nr.: *Test report no.:*	**CN24MHO9 001**	**Auftrags-Nr.:** *Order no.:*	**244555277**	Seite 1 von 114 *Page 1 of 114*
Kunden-Referenz-Nr.: *Client reference no.:*	2175670	**Auftragsdatum:** *Order date:*	2023-10-31	
Auftraggeber: *Client:*	Ningbo Aoke Office Equipment Co., Ltd Science Park Jiangshan Town, Yinzhou District Ningbo, 315100 Zhejiang, P.R. China			
Prüfgegenstand: *Test item:*	Electric height adjustable desk frame			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	AK02YJEST-TY-A-F-M02; AK2YJYT-YZB3-M01; AK2YJYT-TYZF3-M02; AK2YJYT-NZY3-M02; AK2YJYT-TYZF2-M02; (AK2YJYT-YZB3-M01)x2; AK2YJYT-TYZB3-M02; (AK2YJYT-TYZB3-M02)x2			
Auftrags-Inhalt: *Order content*:	CE-MD			
Prüfgrundlage: *Test specification:*	EN 60335-1:2012+A11+A13+A1+A14+A2+A15; EN 62233:2008; EN ISO 12100: 2010			
Wareneingangsdatum: *Date of sample receipt:*	2023-11-15; 2024-07-04			
Prüfmuster-Nr.: *Test sample no:*	A003602844; A003760846			
Prüfzeitraum: *Testing period:*	2024-07-01 to 2024-09-21			
Ort der Prüfung: *Place of testing:*	See page 5			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von: *tested by: Sean Shi*	**genehmigt von:** *authorized by: Martin Qi*
Datum: *Date:* 2024-10-14	**Ausstellungsdatum:** *Issue date:* 2024-10-14
Stellung / *Position:* **PE**	**Stellung** / *Position:* **Reviewer**

Sonstiges / *Other:*
This report contains IEC test report from page 2 to page 101, EU group differences from page 102 to page 114.
Attachment 1: EN ISO 12100 report (20 pages)

Zustand des Prüfgegenstandes bei Anlieferung:
Condition of the test item at delivery:
Prüfmuster vollständig und unbeschädigt
Test item complete and undamaged

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

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Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the ñZero Guard Band Ruleò and ñSimple Acceptanceò in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	- on use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, if these operations have consequences on stability of the appliance in order to avoid overturning, falling or uncontrolled movements of the appliance or of its component parts		N/A
	- on how to maintain adequate mechanical stability when in use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
	- on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided		N/A
	- on the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur the operating method to safely unblock the appliance		N/A
	- on the specifications on the spare parts to be used, when these affect the health and safety of the operator		N/A
	- on airborne noise emissions, determined and declared in accordance with the relevant Part 2, which includes:		N/A
	- the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A) .....;		N/A
	- where this level does not exceed 70 dB(A), this fact is indicated		N/A
	- the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa) .....:		N/A
	- the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A) .....:		N/A
7.12.ZE2	The instructions include a warning to disconnect the appliance from its power source during service and when replacing parts		N/A
	If the removal of the plug is foreseen, it is clearly indicated that the removal of the plug is such that an operator can check from any of the points to which he has access that the plug remains removed		N/A
	If this is not possible, due to the construction of the appliance or its installation, a disconnection with a locking system in the isolated position is provided		N/A
19.11.4.8	The appliance continues to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage fluctuation occurred, or		N/A

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	a manual operation is required to restart it		N/A
20.1	Appliances and their components and fittings have adequate mechanical stability during transportation, assembly, dismantling and any other action involving the appliance		N/A
20.2	Dangerous moving transmission parts safeguarded either by design or guards		N/A
	When guards are used, they are fixed guards, interlocking movable guards or protective devices		N/A
	Moving parts directly involved in the function of the appliance which cannot be made completely inaccessible fitted with:		N/A
	- fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and		N/A
	- adjustable guards restricting access to those sections of the moving parts where access is necessary		N/A
	Interlocking movable guards used where frequent access is required		N/A
21.1	Appliances and their components and fittings have adequate mechanical strength and is constructed to withstand such rough handling that may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the appliance		N/A
22.ZE.1	For appliances provided with a seat, the seat gives adequate stability		N/A
	The distance between the seat and the control devices capable of being adapted to the operator		N/A
22.ZE.2	For appliances provided with separate devices for the start and the stop functions, the stop function is unambiguously identifiable and does always override the start function		N/A
	For appliances provided with one device performing the start and the stop function, the stop function is unambiguously identifiable and does always override the start function		N/A
22.ZE.3	Appliances designed in such a way that incorrect mounting is avoided, if this can lead to an unsafe situation		N/A
	If this is not possible, information on the correct mounting is given directly on the part and/or the enclosure		N/A
22.ZE.4	Where the weight, size or shape prevents appliances from being moved manually, they are fitted with attachments for lifting gear, or		N/A
	so designed that they can be fitted with such attachments, or		N/A

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	be shaped in such a way that standard lifting gear can easily be used		N/A
	Appliances to be moved manually are constructed or equipped so that they can be moved easily and safely		N/A
22.ZE.5	The fixing systems of fixed guards which prevent access to dangerous moving transmission parts only removable with the use of tools		N/A
	If such guards have to be removed by the user for routine cleaning or maintenance their fixing systems remain attached to the fixed guards or to the machine after removal		N/A
	Where possible, guards are incapable of remaining in place without their fixings		N/A
	This does not apply if, after removal of the screws, or if the component is incorrectly repositioned, the appliance becomes inoperative		N/A
	Movable guards are interlocked		N/A
	The interlocking devices prevent the start of hazardous appliance functions until the guards are fixed in their position, and give a stop command whenever they are no longer closed		N/A
	Where it is possible for an operator to reach the danger zone before the risk due to hazardous appliance functions has ceased, movable guards associated with a guard locking device in addition to an interlocking device that:		N/A
	- prevents the start of hazardous appliance functions until the guard is closed and locked, and		N/A
	- keeps the guard closed and locked until the risk of injury from the hazardous appliance functions has ceased		N/A
	Interlocking movable guards remain attached to the appliance when open, and		N/A
	they are designed and constructed in such a way that they can be adjusted only by means of an intentional action		N/A
22.ZE.6	Interlocking movable guards designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous appliance functions		N/A
	The guard is opened to the extent needed to cause the interlocking to operate and is then closed, the number of operations being defined in the specific Part 2 .....:		N/A
	After this test any defect that may be expected in normal use is applied to the interlock system, including interruption of the supply, only one defect being simulated at a time		N/A
	After these tests the interlock system is fit for further use		N/A

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
22.ZE.7	Adjustable guards restricting access to areas of the moving parts strictly necessary for the work are:		N/A
	- adjustable manually or automatically, depending on the type of work involved, and		N/A
	- readily adjustable without the use of tools		N/A
22.ZE.8	In case of interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply, the appliance does not restart		N/A
	However, automatic restarting of the operation is allowed if the appliance may continue to operate, without causing any hazard to the user, from the same point in its operating cycle at which the voltage interruption or fluctuation occurred		N/A
22.ZE.9	Appliances fitted with means to isolate them from all energy sources		N/A
	Such isolators are clearly identified, and		N/A
	they are capable of being locked if reconnection endanger persons		N/A
	After the energy source is disconnected, it is possible to dissipate any energy remaining or stored in the circuits of the appliance without risk to persons		N/A
ZF	**ANNEX ZF** (INFORMATIVE) **CRITERIA APPLIED FOR THE ALLOCATION OF PRODUCTS COVERED BY STANDARDS IN THE EN 60335 SERIES UNDER LVD OR MD**		P
	List of standards under CENELEC/TC61 with the allocation under the LVD (Low Voltage Directive) or the MD (Machinery Directive) .....:		P
ZG	**ANNEX ZG** (NORMATIVE) **UV APPLIANCES**		N/A
	The following modifications to this standard apply to appliances having UV emitters		N/A
	This annex is not applicable to appliances covered by the scopes of IEC 60335-2-27, IEC 60335-2-59 or IEC 60335-2-109		N/A
7.12.ZG	The instructions for appliances incorporating UVC emitters include the substance of the following: WARNING — This appliance contains a UV emitter. Do not stare at the light source		N/A
32	For appliances incorporating UV emitters the manufacturer delivers a declaration providing evidence that the plastic material exposed to the radiation is UV resistant		N/A
ZH	**ANNEX ZH** (INFORMATIVE) **Common plug and socket-outlet types in CENELEC countries**		P

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	In general, supply cords of single-phase appliances having a rated current not exceeding 16 A are fitted with a plug complying with the following standard sheets:		P
	- for class I appliances or class II appliances with functional earth, standard sheet EU2, EU3 or EU4:		N/A
	- for class II appliances, standard sheet EU5, EU6 or EU7 .....:		P
	There are exemptions or differences in certain CENELEC countries		P
ZI	**ANNEX ZI** (INFORMATIVE) **Information on the application of A11:2014 to EN 60335-1:2012 CENELEC CLC/TC 61(SEC)2096A**		P
	Clarification of the application of parts 2 in conjunction with the 2002 or 2012 version of EN 60335-1		P
ZZA	**ANNEX ZZA** (INFORMATIVE) **RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE SAFETY OBJECTIVES OF DIRECTIVE 2014/35/EU [2014 OJ L96} AIMED TO BE COVERED**		N/A
	This standard provides one means of conforming to safety objectives of Directive 2014/35/EU		N/A
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZA.1 confers a presumption of conformity with the safety objectives of that Directive and associated EFTA regulations		N/A
	Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the safety objectives		N/A
ZZB	**ANNEX ZZB** (INFORMATIVE) **RELATIONSHIP BETWEEN THIS EUROPEAN STANDARD AND THE ESSENTIAL REQUIREMENTS OF DIRECTIVE 2006/42/EC AIMED TO BE COVERED**		P
	This standard provides one means of conforming to essential requirements of EU Directive 2006/42/EC		P
	When cited in the Official Journal under that Directive, compliance with the normative clauses of this standard given in Table ZZB.1 confers a presumption of conformity with the essential requirements of that Directive and associated EFTA regulations		P
	Compliance with this Part 1 when used together with the relevant Part 2 provides one means of conformity with the essential health and safety requirements		N/A

IEC60335_1X ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX EN 62233:2008 + AC:2008 **EMF- ELECTROMAGNETICS FIELDS**		P
	The tested product also complies with the requirements of EN 62233:2008		P
	Limit ……100%	Measured max. :2,0 %	P

Prüfbericht-Nr.: *Test report no.:*	**Attachment 1 for CN24MHO9 001**	**Auftrags-Nr.:** *Order no.:*	**244555277**	Seite 1 von 20 *Page 1 of 20*
Kunden-Referenz-Nr.: *Client reference no.:*	2175670	**Auftragsdatum:** *Order date:*	2023-10-31	
Auftraggeber: *Client:*	Ningbo Aoke Office Equipment Co., Ltd Science Park Jiangshan Town, Yinzhou District Ningbo, 315100 Zhejiang, P.R. China			
Prüfgegenstand: *Test item:*	Electric height adjustable desk frame			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	AK02YJEST-TY-A-F-M02; AK2YJYT-YZB3-M01; AK2YJYT-TYZF3-M02; AK2YJYT-NZY3-M02;	AK2YJYT-TYZF2-M02; (AK2YJYT-YZB3-M01)x2; AK2YJYT-TYZB3-M02; (AK2YJYT-TYZB3-M02)x2		
Auftrags-Inhalt: *Order content:*	Test report			
Prüfgrundlage: *Test specification:*	EN ISO 12100: 2010			
Wareneingangsdatum: *Date of sample receipt:*	See CN24MHO9 001			
Prüfmuster-Nr.: *Test sample no:*	See CN24MHO9 001			
Prüfzeitraum: *Testing period:*	See CN24MHO9 001			
Ort der Prüfung: *Place of testing:*	See CN24MHO9 001			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von:
tested by: Sean Shi

Datum:
Date: 2024-10-14

Stellung / *Position:* **PE**

genehmigt von:
authorized by: Martin Qi

Ausstellungsdatum:
Issue date: 2024-10-14

Stellung / *Position:* **Reviewer**

Sonstiges / *Other:*

This report is for evaluation for EN ISO 12100 report, product details refer to the main report CN24MHO9 001.

Zustand des Prüfgegenstandes bei Anlieferung:
Condition of the test item at delivery:

Prüfmuster vollständig und unbeschädigt
Test item complete and undamaged

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Remarks

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EN ISO 12100: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
4.	Strategy for risk assessment and risk reduction		P
	To implement risk assessment and risk reduction the designer shall take the following actions, in the order given (see Figure 1)	Follow the order of figure 1	P
	Risk assessment is a series of logical steps to enable, in a systematic way, the analysis and evaluation of the risks associated with machinery.		P
	Risk assessment is followed, whenever necessary, by risk reduction. Iteration of this process can be necessary to eliminate hazards as far as practicable and to adequately reduce risks by the implementation of protective measures.		P
	It is assumed that, when present on machinery, a hazard will sooner or later lead to harm if no protective measure or measures have been implemented.		P
	Protective measures are the combination of the measures implemented by the designer and the user in accordance with Figure 2. Measures which can be incorporated at the design stage are preferable to those implemented by the user and usually prove more effective.		P
	The objective to be met is the greatest practicable risk reduction, taking into account the four below factors. The strategy defined in this clause is represented by the flowchart in Figure 1. The process itself is iterative and several successive applications can be necessary to reduce the risk, making the best use of available technology.		P
5	Risk assessment		P
5.1	General		P
	Risk assessment comprises (see Figure 1)		P
	- risk analysis		P
	- risk evaluation (see 5.6).		P
5.2	Information for risk assessment		P
	The information for risk assessment should include the following.		P
	a) Related to machinery description		P
	b) Related to regulations, standards and other applicable documents		P
	c) Related to experience of use		P
	d) Relevant ergonomic principles.		P

EN ISO 12100: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
5.3	Determination of limits of machinery		P
5.3.1	General		P
	Risk assessment begins with the determination of the limits of the machinery, taking into account all the phases of the machinery life. This means that the characteristics and performances of the machine or a series of machines in an integrated process, and the related people, environment and products, should be identified in terms of the limits of machinery as given in 5.3.2 to 5.3.5.	Considered	P
5.3.2	Use limits	The product is intended to adjustable height of table frame.	P
5.3.3	Space limits		P
5.3.4	Time limits		P
5.3.5	Other limits		P
5.4	Hazard identification		P
	After determination of the limits of the machinery, the essential step in any risk assessment of the machinery is the systematic identification of reasonably foreseeable hazards (permanent hazards and those which can appear unexpectedly), hazardous situations and/or hazardous events during all phases of the machine life cycle	All phases i.e: transport, assemble, installation, use etc. are considered Risk identification is established	P
	Only when hazards have been identified can steps be taken to eliminate them or to reduce risks. To accomplish this hazard identification, it is necessary to identify the operations to be performed by the machinery and the tasks to be performed by persons who interact with it		P
	The designer shall identify hazards taking into account the following.		P
	a) Human interaction during the whole life cycle of the machine	All reasonably foreseeable hazards, hazardous situations or hazardous events associated are identified.	P
	b) Possible states of the machine.		P
	c) Unintended behaviour of the operator or reasonably foreseeable misuse of the machine		P
5.5	Risk estimation	Risk estimation is carried out	P
5.5.1	General		P

EN ISO 12100: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
	After hazard identification, risk estimation shall be carried out for each hazardous situation by determining the elements of risk given in 5.5.2. When determining these elements, it is necessary to take into account the aspects given in 5.5.3.		P
	If standardized (or other suitable) measurement methods exist for an emission, they should be used, in conjunction with existing machinery or prototypes, to determine emission values and comparative emission data.		P
	Hazards other than emissions that are described by measurable parameters can be dealt with in a similar manner.		P
5.5.2	Elements of risk	All elements of risk are considered.	P
5.5.2.1	General		P
	The risk associated with a particular hazardous situation depends on the following elements:		P
	a) the severity of harm;		P
	b) the probability of occurrence of that harm		P
5.5.2.2	Severity of harm		P
	The severity can be estimated by taking into account the following:		P
	a) the severity of injuries or damage to health		P
	b) the extent of harm		P
	When carrying out a risk assessment, the risk from the most likely severity of the harm that is likely to occur from each identified hazard shall be considered, but the highest foreseeable severity shall also be taken into account, even if the probability of such an occurrence is not high.		P
5.5.2.3	Probability of occurrence of harm		P
5.5.2.3.1	Exposure of persons to the hazard		P
	The exposure of a person to the hazard influences the probability of the occurrence of harm.		P
5.5.2.3.2	Occurrence of a hazardous event		P
	The occurrence of a hazardous event influences the probability of occurrence of harm.		P
5.5.2.3.3	Possibility of avoiding or limiting harm		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The possibility of avoiding or limiting harm influences the probability of occurrence of harm. Factors to be taken into account when estimating the possibility of avoiding or limiting harm		P
5.5.3	Aspects to be considered during risk estimation		P
5.5.3.1	Persons exposed		P
	Risk estimation shall take into account all persons (operators and others) for whom exposure to the hazard is reasonably foreseeable.		P
5.5.3.2	Type, frequency and duration of exposure		P
	The estimation of the exposure to the hazard under consideration (including long-term damage to health) requires analysis of, and shall account for, all modes of operation of the machinery and methods of working. In particular, the analysis shall account for the needs for access during loading/unloading, setting, teaching, process changeover or correction, cleaning, fault-finding and maintenance.		P
	The risk estimation shall also take into account tasks, for which it is necessary to suspend protective measures.		P
5.5.3.3	Relationship between exposure and effects		P
	The relationship between an exposure to a hazard and its effects shall be taken into account for each hazardous situation considered. The effects of accumulated exposure and combinations of hazards shall also be considered. When considering these effects, risk estimation shall, as far as practicable, be based on appropriate recognized data		P
5.5.3.4	Human factors		P
	Human factors can affect risk and shall be taken into account in the risk estimation		P
	Training, experience and ability can affect risk; nevertheless, none of these factors shall be used as a substitute for hazard elimination, risk reduction by inherently safe design measure or safeguarding, wherever these protective measures can be practicably implemented.		P
5.5.3.5	Suitability of protective measures		P
	Risk estimation shall take into account the suitability of protective measures and shall		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) identify the circumstances which can result in harm,		P
	b) whenever appropriate, be carried out using quantitative methods to compare alternative protective measures and		P
	c) provide information that can assist with the selection of appropriate protective measures.		P
	When estimating risk, those components and systems identified as immediately increasing the risk in case of failure need special attention.		P
	When protective measures include work organization, correct behavior, attention, application of personal protective equipment (PPE), skill or training, the relatively low reliability of such measures compared with proven technical protective measures shall be taken into account in the risk estimation.		P
5.5.3.6	Possibility of defeating or circumventing protective measures		P
	For the continued safe operation of a machine, it is important that the protective measures allow its easy use and do not hinder its intended use. Otherwise, there is a possibility that protective measures might be bypassed in order for maximum utility of the machine to be achieved.		P
	Risk estimation shall take account of the possibility of defeating or circumventing protective measures. It shall also take account of the incentive to defeat or circumvent protective measures		P
	Whether or not a protective measure can be defeated depends on both the type of protective measure, such as an adjustable guard or programmable trip device, and its design details.		P
	Protective measures that use programmable electronic systems introduce additional possibilities of defeat or circumvention if access to safety-related software is not appropriately restricted by design and monitoring methods. Risk estimation shall identify where safety-related functions are not separated from other machine functions and shall determine the extent to which access is possible. This is particularly important when remote access for diagnostic or process correction purposes is required.		N/A
5.5.3.7	Ability to maintain protective measures		P
	Risk estimation shall consider whether the protective measures can be maintained in the condition necessary to provide the required level of protection.		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.3.8	Information for use		P
	Risk estimation shall take into account the information for use, as available. See also 6.4.		P
5.6	Risk evaluation	Risk evaluation is carried out	P
5.6.1	General		P
	After risk estimation has been completed, risk evaluation shall be carried out to determine if risk reduction is required. If risk reduction is required, then appropriate protective measures shall be selected and applied.		P
	Achieving the objectives of risk reduction and a favorable outcome of risk comparison applied when practicable gives confidence that risk has been adequately reduced.		P
5.6.2	Adequate risk reduction		P
	Application of the three-step method described in 6.1 is essential in achieving adequate risk reduction.		P
5.6.3	Comparison of risks		P
	As part of the process of risk evaluation, the risks associated with the machinery or parts of machinery can be compared with those of similar machinery or parts of machinery		P
	The use of this comparison method does not eliminate the need to follow the risk assessment process as described in this International Standard for the specific conditions of use. For example, when a band saw used for cutting meat is compared with a band saw used for cutting wood, the risks associated with the different material shall be assessed.		P
6	Risk reduction	Risk reduction is carried out	P
6.1	General		P
	The objective of risk reduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk:		P
	- severity of harm from the hazard under consideration; - probability of occurrence of that harm.		P
	All protective measures intended for reaching this objective shall be applied in the following sequence, referred to as the three-step method (see also Figures 1 and 2).		P
	Step 1: Inherently safe design measures		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Step 2: Safeguarding and/or complementary protective measures		P
	Step 3: Information for use		P
6.2	Inherently safe design measures		P
6.2.1	General		P
	Inherently safe design measures are the first and most important step in the risk reduction process.		P
	Inherently safe design measures are achieved by avoiding hazards or reducing risks by a suitable choice of design features for the machine itself and/or interaction between the exposed persons and the machine.		P
6.2.2	Consideration of geometrical factors and physical aspects		P
6.2.2.1	Geometrical factors		P
	Such factors include the following.		P
	a) The form of machinery is designed to maximize direct visibility of the working areas and hazard zones from the control position - reducing blind spots. so as to take into account the characteristics of human vision, particularly when safe operation requires permanent direct control by the operator. The design of the machine shall be such that, from the main control position, the operator is able to ensure that there are no exposed persons in the danger zones.		P
	b) The form and the relative location of the mechanical components parts		P
	c) Avoiding sharp edges and corners, protruding parts		P
	d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).		P
6.2.2.2	Physical aspects		P
	Such aspects include the following:		P
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;		P
	b) limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing 1) noise emission at source 2) the emission of vibration at source, 3) the emission of hazardous substances, and 4) radiation emissions, including		P
6.2.3	Taking into account general technical knowledge of machine design		P
	This general technical knowledge can be derived from technical specifications for design (standards, design codes, calculation rules, etc.), which should be used to cover		P
	a) mechanical stresses		P
	b) materials and their properties		P
	c) emission values		P
	When the reliability of particular components or assemblies is critical for safety (for example, ropes, chains, lifting accessories for lifting loads or persons), stress limits shall be multiplied by appropriate working coefficients.		P
6.2.4	Choice of appropriate technology		P
	One or more hazards can be eliminated or risks reduced by the choice of the technology to be used in certain applications such as the following:		P
	a) on machines intended for use in explosive atmospheres		N/A
	b) for particular products to be processed		P
	c) the use of alternative equipment to avoid high noise levels		P
6.2.5	Applying principle of positive mechanical action		P
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements.		P
6.2.6	Provisions for stability		P
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use.		P
	Stability shall be considered in all phases of the life cycle of the machine, including handling, travelling, installation, use, dismantling, disabling and scrapping.		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.7	Provisions for maintainability		P
	When designing a machine, the following maintainability factors shall be taken into account to enable maintenance of the machine:		P
	- accessibility - ease of handling, taking into account human capabilities; - limitation of the number of special tools and equipment.		P
6.2.8	Observing ergonomic principles		P
	Ergonomic principles shall be taken into account in designing machinery so as to reduce the mental or physical stress of, and strain on, the operator. These principles shall be considered when allocating functions to operator and machine (degree of automation) in the basic design.		P
	Account shall be taken of body sizes likely to be found in the intended user population, strengths and postures, movement amplitudes, frequency of cyclic actions (see ISO 10075 and ISO 10075-2).		P
	All elements of the operator–machine interface, such as controls, signalling or data display elements, shall be designed to be easily understood so that clear and unambiguous interaction between the operator and the machine is possible. See EN 614-1, EN 13861 and IEC 61310-1.		P
6.2.9	Electrical hazards		P
6.2.10	Pneumatic and hydraulic hazards		N/A
6.2.11	Applying inherently safe design measures to control systems		P
6.2.11.1	General		P
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061).		P
	The correct design of machine control systems can avoid unforeseen and potentially hazardous machine behaviour.		P
6.2.11.2	Starting of an internal power source/switching on an external power supply		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.		P
6.2.11.3	Starting/stopping of a mechanism		P
6.2.11.4	Restart after power interruption		P
6.2.11.5	Interruption of power supply		P
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply.		P
6.2.11.6	Use of automatic monitoring	No such Function	N/A
	Automatic monitoring is intended to ensure that a safety function or functions implemented by a protective measure do not fail to be performed		N/A
	Automatic monitoring either detects a fault immediately or carries out periodic checks so that a fault is detected before the next demand upon the safety function.		N/A
6.2.11.7	Safety functions implemented by programmable electronic control systems	Failure risk assessment was considered	P
6.2.11.7.1	General		P
6.2.11.7.2	Hardware aspects		P
6.2.11.7.3	Software aspects		P
6.2.11.8	Principles relating to manual control		P
	These are as follows.		P
	a) Manual control devices shall be designed and located according to the relevant ergonomic principles		P
	b) A stop control device shall be placed near each start control device.		P
	c) Manual controls shall be located out of reach of the danger zones		P
	d) Whenever possible, control devices and control positions shall be located so that the operator is able to observe the working area or hazard zone		P
	e) the control circuit shall be so arranged that only one control is effective at a given times.		P
	f) Control actuators shall be designed or guarded so that their effect, where a risk is involved, cannot occur without intentional operation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	g) For machine functions whose safe operation depends on permanent, direct control by the operator, measures shall be implemented to ensure the presence of the operator at the control position		P
	h) For cableless control, an automatic stop shall be performed		N/A
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		P
6.2.11.10	Selection of control and operating modes		N/A
	If machinery has been designed and built to allow for its use in several control or operating modes requiring different protective measures and/or work procedures (for example, to allow for adjustment, setting, maintenance, inspection), it shall be fitted with a mode selector which can be locked in each position. Each position of the selector shall be clearly identifiable and shall exclusively allow one control or operating mode.		N/A
	The selector may be replaced by another selection means which restricts the use of certain functions of the machinery to certain categories of operators (for example, access codes for certain numerically controlled functions).		N/A
6.2.11.11	Applying measures to achieve electromagnetic compatibility (EMC)	Covered by EMC Directive	P
	For guidance on electromagnetic compatibility, see IEC 60204-1 and IEC 61000-6.		N/A
6.2.11.12	Provision of diagnostic systems to aid fault-finding		N/A
	Diagnostic systems to aid fault-finding should be included in the control system so that there is no need to disable any protective measure.		N/A
6.2.12	Minimizing probability of failure of safety functions		P
6.2.12.1	General		P
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine.		P
6.2.12.2	Use of reliable components		P
6.2.12.3	Use of “oriented failure mode” components		N/A
	“Oriented failure mode” components or systems are those in which the predominant failure mode is known in advance and which can be used so that the effect of such a failure on the machine function can be predicted.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	NOTE In some cases, it will be necessary to take additional measures to limit the negative effects of such a failure.		N/A
	The use of such components should always be considered, particularly in cases where redundancy (see 6.2.12.4) is not employed.		N/A
6.2.12.4	Duplication (or redundancy) of components or subsystems	Double faults condition were considered	P
6.2.13	Limiting exposure to hazards through reliability of equipment		P
6.2.14	Limiting exposure to hazards through mechanization or automation of loading (feeding)/ unloading (removal) operations		N/A
6.2.15	Limiting exposure to hazards through location of setting and maintenance points outside danger zones		P
6.3	Safeguarding and complementary protective measures		P
6.3.1	General		P
	Guards and protective devices shall be used to protect persons whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks.		P
6.3.2	Selection and implementation of guards and protective devices		P
6.3.2.1	General		P
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine.		P
	A combination of safeguards can sometimes be required.		N/A
	Consideration shall be given to the enclosure of control positions or intervention zones to provide combined protection against several hazards		N/A
6.3.2.2	Where access to the hazard zone is not required during normal operation		P
6.3.2.3	Where access to the hazard zone is required during normal operation of the machinery, safeguards should be selected from the following:		N/A
	a) interlocking guards with or without guard locking		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) sensitive protective equipment		N/A
	c) adjustable guards;		N/A
	d) self-closing guards		N/A
	e) two-hand control devices		N/A
	f) interlocking guards with a start function		N/A
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault-finding, cleaning or maintenance		N/A
6.3.2.5	Selection and implementation of sensitive protective equipment		N/A
6.3.2.5.1	Selection		N/A
	Due to the great diversity of the technologies on which their detection function is based, all types of sensitive protective equipment are far from being equally suitable for safety applications. The following provisions are intended to provide the designer with criteria for selecting, for each application, the most suitable device(s).		N/A
6.3.2.5.2	Implementation		N/A
	Consideration should be given to		N/A
	a) the size, characteristics and positioning of the detection zone		N/A
	b) the reaction of the device to fault conditions		N/A
	c) the possibility of circumvention, and		N/A
	d) detection capability and its variation over the course of time		N/A
	Sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine		N/A
6.3.2.5.3	Additional requirements for sensitive protective equipment when used for cycle initiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	In this exceptional application, the starting of the machine cycle is initiated by the withdrawal of a person or of the detected part of a person from the sensing field of the sensitive protective equipment, without any additional start command, hence deviating from the general requirement given in the second point of the dashed list in 6.3.2.5.2, above. After switching on the power supply, or when the machine has been stopped by the tripping function of the sensitive protective equipment, the machine cycle shall be initiated only by voluntary actuation of a start control.		N/A
6.3.2.6	Protective measures for stability	Achieved by design	N/A
	If stability cannot be achieved by inherently safe design measures such as weight distribution (see 6.2.6), it shall be maintained by the use of protective measures		N/A
6.3.2.7	Other protective devices		N/A
	When a machine requires continuous control by the operator (for example, mobile machines, cranes) and an error of the operator can generate a hazardous situation, this machine shall be equipped with the necessary devices to enable the operation to remain within specified limits		N/A
6.3.3	Requirements for design of guards and protective devices		P
6.3.3.1	General requirements		P
	Guards and protective devices shall be designed to be suitable for the intended use, taking into account mechanical and other hazards involved. Guards and protective devices shall be compatible with the working environment of the machine and designed so that they cannot be easily defeated. They shall provide the minimum possible interference with activities during operation and other phases of machine life, in order to reduce any incentive to defeat them.		P
	NOTE For additional information, see ISO 14120, ISO 13849-1, ISO 13851, ISO 14119, ISO 13856, IEC 61496 and IEC 62061.		P
	Guards and protective devices shall		P
	a) be of robust construction,		P
	b) not give rise to any additional hazard,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) not be easy to bypass or render non-operational,		P
	d) be located at an adequate distance from the danger zone (see ISO 13855 and ISO 13857),		P
	e) cause minimum obstruction to the view of the production process, and		P
	f) enable essential work to be carried out for the installation and/or replacement of tools and for maintenance by allowing access only to the area where the work has to be carried out — if possible, without the guard having to be removed or protective device having to be disabled.		P
	For openings in the guards, see ISO 13857.		P
6.3.3.2	Requirements for guards		P
6.3.3.3	Technical characteristics of protective devices		N/A
	Protective devices shall be selected or designed and connected to the control system such that correct implementation of their safety function(s) is ensured.		N/A
6.3.3.4	Provisions for alternative types of safeguards		N/A
	Provisions should be made to facilitate the fitting of alternative types of safeguards on machinery where it is known that it will be necessary to change the safeguards because of the range of work to be carried out.		N/A
6.3.4	Safeguarding to reduce emissions		P
6.3.4.1	General		P
	If the measures for the reduction of emissions at source specified in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).		P
6.3.4.2	Noise		N/A
	Additional protective measures against noise		N/A
6.3.4.3	Vibration		N/A
	Additional protective measures against vibration		N/A
6.3.4.4	Hazardous substances	No hazardous substances	P
	Additional protective measures against hazardous substances See ISO 14123-1.		N/A
6.3.4.5	Radiation	No hazard of radiation	P
	Additional protective measures against radiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.5	Complementary protective measures		P
6.3.5.1	General		P
	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices), nor information for use, could have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine..	Considered	P
6.3.5.2	Components and elements to achieve emergency stop function		N/A
6.3.5.3	Measures for the escape and rescue of trapped persons		N/A
	Measures for the escape and rescue of trapped persons may consist, among others, of - escape routes and shelters in installations generating operator-trapping hazards, - arrangements for moving some elements by hand, after an emergency stop, - arrangements for reversing the movement of some elements, - anchorage points for descender devices, - means of communication to enable trapped operators to call for help.		N/A
6.3.5.4	Measures for isolation and energy dissipation		P
	Machines shall be equipped with the technical means to achieve isolation from power supply(ies) and dissipation of stored energy	Power plug provided for this purpose.	P
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts	Stationary appliance	N/A
	Machines and their component parts which cannot be moved or transported by hand shall be provided or be capable of being provided with suitable attachment devices for transport by means of lifting gear.		N/A
6.3.5.6	Measures for safe access to machinery		N/A
	Machinery shall be so designed as to enable operation and all routine tasks relating to setting and/or maintenance to be carried out as far as possible by a person remaining at ground level.		N/A
6.4	Information for use		P
6.4.1	General requirements		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.1.1	Drafting information for use is an integral part of the design of a machine		P
6.4.1.2	Information shall be provided to the user about the intended use of the machine, taking into account, notably, all its operating modes.		P
	The information shall contain all directions required to ensure safe and correct use of the machine. With this in view, it shall inform and warn the user about residual risk.		P
6.4.1.3	Information for use shall cover, separately or in combination, transport, assembly and installation, commissioning, use of the machine (setting, teaching/programming or process changeover, operation, cleaning, fault-finding and maintenance) and, if necessary, dismantling, disabling and scrapping.		P
6.4.2	Location and nature of information for use		P
6.4.3	Signals and warning devices		N/A
	Visual signals, such as flashing lights and audible signals such as sirens may be used to warn of an impending hazardous event such as machine start-up or overspeed. Such signals may also be used to warn the operator before the triggering of automatic protective measures		N/A
	The warning devices shall be designed and located such that checking is easy. The information for use shall prescribe regular checking of warning devices.		N/A
	The attention of designers is drawn to the possibility of “sensorial saturation”, which can result from too many visual and/or acoustic signals and which can also lead to defeating the warning devices. NOTE Consultation of the user on this subject is often necessary.		N/A
6.4.4	Markings, signs (pictograms) and written warnings		P
	Machinery shall bear all markings which are necessary		P
6.4.5	Accompanying documents (in particular - instruction handbook)		P
7	Documentation of risk assessment and risk reduction		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation of		P
	Standards or other specifications used to select protective measures referred to in f) above should be referenced. NOTE No requirement is given in this International Standard to deliver the risk assessment documentation together with the machine. See ISO/TR 14121-2 for information on documentation.		P

---End of test report---