TEST REPORT
Directive 2006/42/EC – Annex I
EN ISO 12100:2010 – Safety of machinery
General principles for design – Risk assessment and risk reduction

Report Reference No. ..... :	EFGX24010384-IE-01-L02
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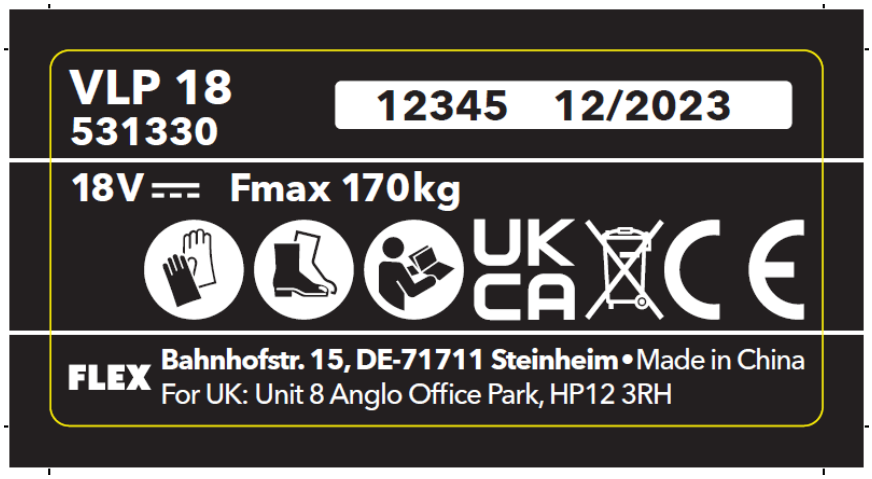
Date of issue ..... :	2024-05-09
Testing Laboratory ..... :	Eurofins Electrical Testing Service (Shenzhen) Co., Ltd
Address ..... :	Room 20 of 2/F., 1/F., Building 2, Spring Block, Meishenghuigu Innovation Park, No. 83, Dabao Road, Bao'an District, Shenzhen, Guangdong, China
Testing location/procedure ..... :	TL ☒ RMT ☐ SMT ☐ WMT ☐ TMP ☐
Address ..... :	Room 20 of 2/F., 1/F., Building 2, Spring Block, Meishenghuigu Innovation Park, No. 83, Dabao Road, Bao'an District, Shenzhen, Guangdong, China
Applicant name ..... :	Nemo Power Tools Limited
Address ..... :	21st Floor, CMA Building, 64 Connaught Road Central, Hong Kong
Test specification:	
Standard ..... :	Directive 2006/42/EC – Annex I EN ISO 12100-1: 2010
Test procedure ..... :	CE-MD
Non-standard test method..... .....:	N/A
Test Report Form No. ..... :	TTRF_2006_42_EC_C
Test item description ..... :	Vacuum Lifter
Trade Mark ..... :	FLEX
Manufacturer ..... :	FLEX-Elektrowerkzeuge GmbH Bahnhofstrasse 15, D-71711 Steinheim, Germany
Factory	Nemo Power Tools (Huizhou) Co., Ltd 2/F, 4th Industrial Area, Luokeng Village, Xiaotie Zone, Xiaojinkou Town, Huicheng District, Huizhou City, Guangdong Province, China
Model/Type reference ..... :	VLP 18
Ratings ..... :	18V⎓, Class III

Copy of marking plate:
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

For Vacuum Lifter



For Battery (model AP18.0/5.0)

Remark:

1. The additional markings which do not give rise to misunderstanding maybe added.
2. Additional information which is required by national difference or regulation maybe added.
3. The series no., date code of manufacture will be changed accordingly.

Test item particulars:	
Class of tool	Hand-held, battery-powered
Type of operation	Intermittent
Degree of protection	N/A
Accessories and detachable parts included	Yes, battery pack
Other options included	N/A
For battery tools and battery packs:	
Tools also could operated directly from mains	N/A
Battery pack	Yes
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing:	
Date of receipt of test item	2024-01-29
Date(s) of performance of test	2024-01-29 to 2024-05-09

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a comma is used as the decimal separator.

Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.

The related applicable CTL/OSM decisions have been considered and the requirements found fulfilled.

Re-assessment shall be made if appropriate particular requirements for this kind of product is published.

This report is intended to be used together with test report ref. no. EFGX24010384-IE-01-L01.

General product information and other remarks:

The Vacuum lifter is considered as battery tool, which is designed for professional lifting, moving, and placing objects like stone pavers, tiles, drywall, furniture and large appliances.

The tool is powered by the detachable battery pack which is intended to be removed from the tool for charging purpose.

The battery system which consist of the battery pack and charger was tested and approved by DEKRA according to IEC 62841-1:2014, with CB certification no. NL-86528.

The tool can be powered by the battery pack AP18.0/2.5, AP18.0/5.0 or AP18.0/8.0 according to the user manual. AP18.0/8.0 was chosen as the representative battery to perform the tests.

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Clause	Requirement + Test	Result - Remark	Verdict

I	**ANNEX I** **Essential health and safety requirements relating to the design and construction of machinery**		--
	GENERAL PRINCIPLES		--
1.	The manufacturer of machinery or his authorised representative must ensure that a risk assessment is carried out in order to determine the health and safety requirements which apply to the machinery. The machinery must then be designed and constructed taking into account the results of the risk assessment.		--
	By the iterative process of risk assessment and risk reduction referred to above, the manufacturer or his authorised representative shall:		--
	- determine the limits of the machinery, which include the intended use and any reasonably foreseeable misuse thereof,		--
	- identify the hazards that can be generated by the machinery and the associated hazardous situations,		--
	- estimate the risks, taking into account the severity of the possible injury or damage to health and the probability of its occurrence,		--
	- evaluate the risks, with a view to determining whether risk reduction is required, in accordance with the objective of this Directive,		--
	- eliminate the hazards or reduce the risks associated with these hazards by application of protective measures, in the order of priority established in section 1.1.2(b).		--
2.	The obligations laid down by the essential health and safety requirements only apply when the corresponding hazard exists for the machinery in question when it is used under the conditions foreseen by the manufacturer or his authorised representative or in foreseeable abnormal situations. In any event, the principles of safety integration referred to in section 1.1.2 and the obligations concerning marking of machinery and instructions referred to in sections 1.7.3 and 1.7.4 apply.		--
3.	The essential health and safety requirements laid down in this Annex are mandatory; However, taking into account the state of the art, it may not be possible to meet the objectives set by them. In that event, the machinery must, as far as possible, be designed and constructed with the purpose of approaching these objectives.		--
4.	This Annex is organised in several parts. The first one has a general scope and is applicable to all kinds of machinery. The other parts refer to certain kinds of more specific hazards. Nevertheless, it is essential to examine the whole of this Annex in order to be sure of meeting all the relevant essential requirements. When machinery is being designed, the requirements of the general part and the requirements of one or more of the other parts shall be taken into account, depending on the results of the risk assessment carried out in accordance with point 1 of these General Principles.		--
1.	**ESSENTIAL HEALTH AND SAFETY REQUIREMENTS**		--
1.1.	**GENERAL REMARKS**		--
1.1.1.	**Definitions**		--
1.1.2.	**Principles of safety integration**		--
	a) Machinery must be designed and constructed so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof.		P

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	The aim of measures taken must be to eliminate any risk throughout the foreseeable lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping.		P
	b) In selecting the most appropriate methods, the manufacturer or his authorised representative must apply the following principles, in the order given:		P
	- eliminate or reduce risks as far as possible (inherently safe machinery design and construction),		P
	- take the necessary protective measures in relation to risks that cannot be eliminated,		P
	- inform users of the residual risks due to any shortcomings of the protective measures adopted, indicate whether any particular training is required and specify any need to provide personal protective equipment.		P
	c) When designing and constructing machinery and when drafting the instructions, the manufacturer or his authorised representative must envisage not only the intended use of the machinery but also any reasonably foreseeable misuse thereof.		P
	The machinery must be designed and constructed in such a way as to prevent abnormal use if such use would engender a risk. Where appropriate, the instructions must draw the user's attention to ways — which experience has shown might occur — in which the machinery should not be used.		P
	d) Machinery must be designed and constructed to take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protective equipment.		P
	e) Machinery must be supplied with all the special equipment and accessories essential to enable it to be adjusted, maintained and used safely.		P
1.1.3.	**Materials and products**		--
	The materials used to construct machinery or products used or created during its use must not endanger persons' safety or health. In particular, where fluids are used, machinery must be designed and constructed to prevent risks due to filling, use, recovery or draining.		P
1.1.4.	**Lighting**		--
	Machinery must be supplied with integral lighting suitable for the operations concerned where the absence thereof is likely to cause a risk despite ambient lighting of normal intensity.		N/A

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	Machinery must be designed and constructed so that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects on moving parts due to the lighting.		P
	Internal parts requiring frequent inspection and adjustment, and maintenance areas must be provided with appropriate lighting.		P
1.1.5.	**Design of machinery to facilitate its handling**		--
	Machinery, or each component part thereof, must:		P
	- be capable of being handled and transported safely,;		P
	- be packaged or designed so that it can be stored safely and without damage.		P
	During the transportation of the machinery and/or its component parts, there must be no possibility of sudden movements or of hazards due to instability as long as the machinery and/or its component parts are handled in accordance with the instructions.		P
	Where the weight, size or shape of machinery or its various component parts prevents them from being moved by hand, the machinery or each component part must:		N/A
	- either be fitted with attachments for lifting gear, or		N/A
	- be designed so that it can be fitted with such attachments, or		N/A
	- be shaped in such a way that standard lifting gear can easily be attached.		N/A
	Where machinery or one of its component parts is to be moved by hand, it must:		--
	- either be easily moveable, or		P
	- be equipped for picking up and moving safely.		P
	Special arrangements must be made for the handling of tools and/or machinery parts which, even if lightweight, could be hazardous.		N/A
1.1.6.	**Ergonomics**		--
	Under the intended conditions of use, the discomfort, fatigue and physical and psychological stress faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as:		P
	- allowing for the variability of the operator's physical dimensions, strength and stamina,		P
	- providing enough space for movements of the parts of the operator's body,		P
	- avoiding a machine-determined work rate,		P
	- avoiding monitoring that requires lengthy concentration,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- adapting the man/machinery interface to the foreseeable characteristics of the operators.		P
1.1.7.	**Operating positions**		--
	The operating position must be designed and constructed in such a way as to avoid any risk due to exhaust gases and/or lack of oxygen.		P
	If the machinery is intended to be used in a hazardous environment presenting risks to the health and safety of the operator or if the machinery itself gives rise to a hazardous environment, adequate means must be provided to ensure that the operator has good working conditions and is protected against any foreseeable hazards.		N/A
	Where appropriate, the operating position must be fitted with an adequate cabin designed, constructed and/or equipped to fulfil the above requirements. The exit must allow rapid evacuation. Moreover, when applicable, an emergency exit must be provided in a direction which is different from the usual exit.		N/A
1.1.8.	**Seating**		--
	Where appropriate and where the working conditions so permit, work stations constituting an integral part of the machinery must be designed for the installation of seats.		N/A
	If the operator is intended to sit during operation and the operating position is an integral part of the machinery, the seat must be provided with the machinery.		N/A
	The operator's seat must enable him to maintain a stable position. Furthermore, the seat and its distance from the control devices must be capable of being adapted to the operator.		N/A
	If the machinery is subject to vibrations, the seat must be designed and constructed in such a way as to reduce the vibrations transmitted to the operator to the lowest level that is reasonably possible. The seat mountings must withstand all stresses to which they can be subjected. Where there is no floor beneath the feet of the operator, footrests covered with a slip-resistant material must be provided.		N/A
1.2.	**CONTROL SYSTEMS**		--
1.2.1.	**Safety and reliability of control systems**		--
	Control systems must be designed and constructed in such a way as to prevent hazardous situations from arising. Above all, they must be designed and constructed in such a way that:		P
	- they can withstand the intended operating stresses and external influences		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- a fault in the hardware or the software of the control system does not lead to hazardous situations,		P
	- errors in the control system logic do not lead to hazardous situations,		P
	- reasonably foreseeable human error during operation does not lead to hazardous situations.		P
	Particular attention must be given to the following points:		--
	- the machinery must not start unexpectedly,		P
	- the parameters of the machinery must not change in an uncontrolled way, where such change may lead to hazardous situations,		P
	- the machinery must not be prevented from stopping if the stop command has already been given,		P
	- no moving part of the machinery or piece held by the machinery must fall or be ejected,		P
	- automatic or manual stopping of the moving parts, whatever they may be, must be unimpeded,		P
	- the protective devices must remain fully effective or give a stop command,		P
	- the safety-related parts of the control system must apply in a coherent way to the whole of an assembly of machinery and/or partly completed machinery.		P
	For cable-less control, an automatic stop must be activated when correct control signals are not received, including loss of communication.	No such function	N/A
1.2.2.	**Control devices**		--
	Control devices must be:		--
	- clearly visible and identifiable, using pictograms where appropriate,	obviously to user	P
	- positioned in such a way as to be safely operated without hesitation or loss of time and without ambiguity,		P
	- designed in such a way that the movement of the control device is consistent with its effect,		P
	- located outside the danger zones, except where necessary for certain control devices such as an emergency stop or a teach pendant,	no danger zone	P
	- positioned in such a way that their operation cannot cause additional risk,		P
	- designed or protected in such a way that the desired effect, where a hazard is involved, can only be achieved by a deliberate action,		P
	- made in such a way as to withstand foreseeable forces; particular attention must be paid to emergency stop devices liable to be subjected to considerable forces.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Where a control device is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence, the action to be performed must be clearly displayed and subject to confirmation, where necessary.		P
	Control devices must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles.		P
	Machinery must be fitted with indicators as required for safe operation. The operator must be able to read them from the control position.		P
	From each control position, the operator must be able to ensure that no-one is in the danger zones, or the control system must be designed and constructed in such a way that starting is prevented while someone is in the danger zone.		P
	If neither of these possibilities is applicable, before the machinery starts, an acoustic and/or visual warning signal must be given. The exposed persons must have time to leave the danger zone or prevent the machinery starting up.		N/A
	If necessary, means must be provided to ensure that the machinery can be controlled only from control positions located in one or more predetermined zones or locations.		N/A
	Where there is more than one control position, the control system must be designed in such a way that the use of one of them precludes the use of the others, except for stop controls and emergency stops.		N/A
	When machinery has two or more operating positions, each position must be provided with all the required control devices without the operators hindering or putting each other into a hazardous situation.		N/A
1.2.3.	**Starting**		--
	It must be possible to start machinery only by voluntary actuation of a control device provided for the purpose.	Switch	P
	The same requirement applies:		--
	- when restarting the machinery after a stoppage, whatever the cause,	Switch	P
	- when effecting a significant change in the operating conditions.	Switch	P
	However, the restarting of the machinery or a change in operating conditions may be effected by voluntary actuation of a device other than the control device provided for the purpose, on condition that this does not lead to a hazardous situation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For machinery functioning in automatic mode, the starting of the machinery, restarting after a stoppage, or a change in operating conditions may be possible without intervention, provided this does not lead to a hazardous situation.		P
	Where machinery has several starting control devices and the operators can therefore put each other in danger, additional devices must be fitted to rule out such risks. If safety requires that starting and/or stopping must be performed in a specific sequence, there must be devices which ensure that these operations are performed in the correct order.		N/A
1.2.4.	**Stopping**		--
1.2.4.1.	**Normal stop**		--
	Machinery must be fitted with a control device whereby the machinery can be brought safely to a complete stop.		P
	Each workstation must be fitted with a control device to stop some or all of the functions of the machinery, depending on the existing hazards, so that the machinery is rendered safe.		P
	The machinery's stop control must have priority over the start controls.		P
	Once the machinery or its hazardous functions have stopped, the energy supply to the actuators concerned must be cut off.		P
1.2.4.2.	**Operational stop**		--
	Where, for operational reasons, a stop control that does not cut off the energy supply to the actuators is required, the stop condition must be monitored and maintained.		P
1.2.4.3.	**Emergency stop**		--
	Machinery must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted.		N/A
	The following exceptions apply:		--
	- machinery in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken,		N/A
	- portable hand-held and/or hand-guided machinery..		N/A
	The device must:		--
	- have clearly identifiable, clearly visible and quickly accessible control devices,		N/A
	- stop the hazardous process as quickly as possible, without creating additional risks,		N/A
	- where necessary, trigger or permit the triggering of certain safeguard movements.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Once active operation of the emergency stop device has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting.		N/A
	The emergency stop function must be available and operational at all times, regardless of the operating mode.		N/A
	Emergency stop devices must be a back-up to other safeguarding measures and not a substitute for them.		N/A
1.2.4.4.	**Assembly of machinery**		--
	In the case of machinery or parts of machinery designed to work together, the machinery must be designed and constructed in such a way that the stop controls, including the emergency stop devices, can stop not only the machinery itself but also all related equipment, if its continued operation may be dangerous.		N/A
1.2.5.	**Selection of control or operating modes**		--
	The control or operating mode selected must override all other control or operating modes, with the exception of the emergency stop.	Not multi control /operating mode	N/A
	If machinery has been designed and constructed to allow its use in several control or operating modes requiring different protective measures and/or work procedures, it must be fitted with a mode selector which can be locked in each position. Each position of the selector must be clearly identifiable and must correspond to a single operating or control mode.		N/A
	The selector may be replaced by another selection method which restricts the use of certain functions of the machinery to certain categories of operator.		N/A
	If, for certain operations, the machinery must be able to operate with a guard displaced or removed and/or a protective device disabled, the control or operating mode selector must simultaneously:		N/A
	- disable all other control or operating modes,		N/A
	- permit operation of hazardous functions only by control devices requiring sustained action,		N/A
	- permit the operation of hazardous functions only in reduced risk conditions while preventing hazards from linked sequences,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- prevent any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.		N/A
	If these four conditions cannot be fulfilled simultaneously, the control or operating mode selector must activate other protective measures designed and constructed to ensure a safe intervention zone.		N/A
	In addition, the operator must be able to control operation of the parts he is working on from the adjustment point.		N/A
1.2.6.	**Failure of the power supply**		--
	The interruption, the re-establishment after an interruption or the fluctuation in whatever manner of the power supply to the machinery must not lead to dangerous situations.	Not lead to dangerous situations	P
	Particular attention must be given to the following points:		--
	- the machinery must not start unexpectedly,		P
	- the parameters of the machinery must not change in an uncontrolled way when such change can lead to hazardous situations,		P
	- the machinery must not be prevented from stopping if the command has already been given,		P
	- no moving part of the machinery or piece held by the machinery must fall or be ejected,		P
	- automatic or manual stopping of the moving parts, whatever they may be, must be unimpeded,		P
	- the protective devices must remain fully effective or give a stop command.		P
1.3.	**PROTECTION AGAINST MECHANICAL HAZARDS**		--
1.3.1.	**Risk of loss of stability**		--
	Machinery and its components and fittings must be stable enough to avoid overturning, falling or uncontrolled movements during transportation, assembly, dismantling and any other action involving the machinery.		P
	If the shape of the machinery itself or its intended installation does not offer sufficient stability, appropriate means of anchorage must be incorporated and indicated in the instructions.		N/A
1.3.2.	**Risk of break-up during operation**		--
	The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used.		P
	The durability of the materials used must be adequate for the nature of the working environment foreseen by the manufacturer or his authorised representative, in particular as regards the phenomena of fatigue, ageing, corrosion and abrasion.		P

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	The instructions must indicate the type and frequency of inspections and maintenance required for safety reasons. They must, where appropriate, indicate the parts subject to wear and the criteria for replacement.		P
	Where a risk of rupture or disintegration remains despite the measures taken, the parts concerned must be mounted, positioned and/or guarded in such a way that any fragments will be contained, preventing hazardous situations.		P
	Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected to ensure that no risk is posed by a rupture.		P
	Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to persons:		P
	- when the workpiece comes into contact with the tool, the latter must have attained its normal working condition,		P
	- when the tool starts and/or stops (intentionally or accidentally), the feed movement and the tool movement must be coordinated.		P
1.3.3.	**Risks due to falling or ejected objects**		--
	Precautions must be taken to prevent risks from falling or ejected objects.		N/A
1.3.4.	**Risks due to surfaces, edges or angles**		--
	Insofar as their purpose allows, accessible parts of the machinery must have no sharp edges, no sharp angles and no rough surfaces likely to cause injury		P
1.3.5.	**Risks related to combined machinery**		--
	Where the machinery is intended to carry out several different operations with manual removal of the piece between each operation (combined machinery), it must be designed and constructed in such a way as to enable each element to be used separately without the other elements constituting a risk for exposed persons.		N/A
	For this purpose, it must be possible to start and stop separately any elements that are not protected.		N/A
1.3.6.	**Risks related to variations in operating conditions**		--
	Where the machinery performs operations under different conditions of use, it must be designed and constructed in such a way that selection and adjustment of these conditions can be carried out safely and reliably.		N/A
1.3.7.	**Risks related to moving parts**		--

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	The moving parts of machinery must be designed and constructed in such a way as to prevent risks of contact which could lead to accidents or must, where risks persist, be fitted with guards or protective devices.		P
	All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work. In cases where, despite the precautions taken, a blockage is likely to occur, the necessary specific protective devices and tools must, when appropriate, be provided to enable the equipment to be safely unblocked.	No accessible moving part	N/A
	The instructions and, where possible, a sign on the machinery shall identify these specific protective devices and how they are to be used.		N/A
1.3.8.	**Choice of protection against risks arising from moving parts**		--
	Guards or protective devices designed to protect against risks arising from moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help to make the choice.		P
1.3.8.1.	**Moving transmission par**		--
	Guards designed to protect persons against the hazards generated by moving transmission parts must be:		P
	- either fixed guards as referred to in section 1.4.2.1, or		P
	- interlocking movable guards as referred to in section 1.4.2.2.		N/A
	Interlocking movable guards should be used where frequent access is envisaged.		N/A
1.3.8.2.	**Moving parts involved in the process**		--
	Guards or protective devices designed to protect persons against the hazards generated by moving parts involved in the process must be:		--
	- either fixed guards as referred to in section 1.4.2.1, or		P
	- interlocking movable guards as referred to in section 1.4.2.2, or		N/A
	- protective devices as referred to in section 1.4.3, or		N/A
	- a combination of the above.		N/A
	However, when certain moving parts directly involved in the process cannot be made completely inaccessible during operation owing to operations requiring operator intervention, such parts must be 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 as referred to in section 1.4.2.3 restricting access to those sections of the moving parts where access is necessary.		N/A

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1.3.9.	**Risks of uncontrolled movements**		--
	When a part of the machinery has been stopped, any drift away from the stopping position, for whatever reason other than action on the control devices, must be prevented or must be such that it does not present a hazard.		N/A
1.4.	**REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES**		--
1.4.1.	**General requirements**		--
	Guards and protective devices must:		--
	- be of robust construction,		P
	- be securely held in place,		P
	- not give rise to any additional hazard,		P
	- not be easy to by-pass or render non-operational,		P
	- be located at an adequate distance from the danger zone,		P
	- cause minimum obstruction to the view of the production process, and		P
	- enable essential work to be carried out on the installation and/or replacement of tools and for maintenance purposes by restricting access exclusively to the area where the work has to be done, if possible without the guard having to be removed or the protective device having to be disabled.		P
	In addition, guards must, where possible, protect against the ejection or falling of materials or objects and against emissions generated by the machinery.		P
1.4.2.	**Special requirements for guards**		--
1.4.2.1.	**Fixed guards**		--
	Fixed guards must be fixed by systems that can be opened or removed only with tools.		P
	Their fixing systems must remain attached to the guards or to the machinery when the guards are removed.		P
	Where possible, guards must be incapable of remaining in place without their fixings.		P
1.4.2.2.	**Interlocking movable guards**		--
	Interlocking movable guards must:		N/A
	- as far as possible remain attached to the machinery when open,		N/A
	- be designed and constructed in such a way that they can be adjusted only by means of an intentional action.		N/A
	Interlocking movable guards must be associated with an interlocking device that:		N/A
	- prevents the start of hazardous machinery functions until they are closed and		N/A

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	- gives 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 the hazardous machinery functions has ceased, movable guards must be associated with a guard locking device in addition to an interlocking device that:		N/A
	- prevents the start of hazardous machinery 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 machinery functions has ceased.		N/A
	Interlocking movable guards must be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous machinery functions.		N/A
1.4.2.3.	**Adjustable guards restricting access**		--
	Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must be:		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
1.4.3.	**Special requirements for protective devices**		--
	Protective devices must be designed and incorporated into the control system in such a way that:		N/A
	- moving parts cannot start up while they are within the operator's reach,		N/A
	- persons cannot reach moving parts while the parts are moving, and		N/A
	- the absence or failure of one of their components prevents starting or stops the moving parts.		N/A
	Protective devices must be adjustable only by means of an intentional action.		N/A
1.5.	**RISKS DUE TO OTHER HAZARDS**		--
1.5.1.	**Electricity supply**		--
	Where machinery has an electricity supply, it must be designed, constructed and equipped in such a way that all hazards of an electrical nature are or can be prevented.		P
	The safety objectives set out in Directive 73/23/EEC shall apply to machinery. However, the obligations concerning conformity assessment and the placing on the market and/or putting into service of machinery with regard to electrical hazards are governed solely by this Directive.		P
1.5.2.	**Static electricity**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Machinery must be designed and constructed to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system.		P
1.5.3.	**Energy supply other than electricity**		--
	Where machinery is powered by source of energy other than electricity, it must be so designed, constructed and equipped as to avoid all potential risks associated with such sources of energy.		N/A
1.5.4.	**Errors of fitting**		--
	Errors likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design and construction of such parts or, failing this, by information given on the parts themselves and/or their housings. The same information must be given on moving parts and/or their housings where the direction of movement needs to be known in order to avoid a risk.		P
	Where necessary, the instructions must give further information on these risks.		P
	Where a faulty connection can be the source of risk, incorrect connections must be made impossible by design or, failing this, by information given on the elements to be connected and, where appropriate, on the means of connection.		P
1.5.5.	**Extreme temperatures**		--
	Steps must be taken to eliminate any risk of injury arising from contact with or proximity to machinery parts or materials at high or very low temperatures.		N/A
	The necessary steps must also be taken to avoid or protect against the risk of hot or very cold material being ejected.		N/A
1.5.6.	**Fire**		--
	Machinery must be designed and constructed in such a way as to avoid any risk of fire or overheating posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.		P
1.5.7.	**Explosion**		--
	Machinery must be designed and constructed in such a way as to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.		P
	Machinery must comply, as far as the risk of explosion due to its use in a potentially explosive atmosphere is concerned, with the provisions of the specific Community Directives.		N/A
1.5.8.	**Noise**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Machinery must be designed and constructed in such a way that risks resulting from the emission of airborne noise are reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source.		P
	The level of noise emission may be assessed with reference to comparative emission data for similar machinery.		P
1.5.9.	**Vibrations**		--
	Machinery must be designed and constructed in such a way that risks resulting from vibrations produced by the machinery are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.		P
	The level of vibration emission may be assessed with reference to comparative emission data for similar machinery.		P
1.5.10.	**Radiation**		--
	Undesirable radiation emissions from the machinery must be eliminated or be reduced to levels that do not have adverse effects on persons.		P
	Any functional ionising radiation emissions must be limited to the lowest level which is sufficient for the proper functioning of the machinery during setting, operation and cleaning. Where a risk exists, the necessary protective measures must be taken.		N/A
	Any functional non-ionising radiation emissions during setting, operation and cleaning must be limited to levels that do not have adverse effects on persons.		P
1.5.11.	**External radiation**		--
	Machinery must be designed and constructed in such a way that external radiation does not interfere with its operation.		P
1.5.12.	**Laser radiation**		--
	Where laser equipment is used, the following should be taken into account:		--
	- laser equipment on machinery must be designed and constructed in such a way as to prevent any accidental radiation,	No laser	N/A
	- laser equipment on machinery must be protected in such a way that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health,		N/A
	- optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by laser radiation.		N/A
1.5.13.	**Emissions of hazardous materials and substances**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Machinery must be designed and constructed in such a way that risks of inhalation, ingestion, contact with the skin, eyes and mucous membranes and penetration through the skin of hazardous materials and substances which it produces can be avoided.	No risks of inhalation, ingestion	N/A
	Where a hazard cannot be eliminated, the machinery must be so equipped that hazardous materials and substances can be contained, evacuated, precipitated by water spraying, filtered or treated by another equally effective method.		N/A
	Where the process is not totally enclosed during normal operation of the machinery, the devices for containment and/or evacuation must be situated in such a way as to have the maximum effect.		N/A
1.5.14.	**Risk of being trapped in a machine**		--
	Machinery must be designed, constructed or fitted with a means of preventing a person from being enclosed within it or, if that is impossible, with a means of summoning help.		N/A
1.5.15.	**Risk of slipping, tripping or falling**		--
	Parts of the machinery where persons are liable to move about or stand must be designed and constructed in such a way as to prevent persons slipping, tripping or falling on or off these parts.		N/A
	Where appropriate, these parts must be fitted with handholds that are fixed relative to the user and that enable them to maintain their stability.		N/A
1.5.16.	**Lightning**		--
	Machinery in need of protection against the effects of lightning while being used must be fitted with a system for conducting the resultant electrical charge to earth.		N/A
1.6.	**MAINTENANCE**		--
1.6.1.	**Machinery maintenance**		--
	Adjustment and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair, cleaning and servicing operations while machinery is at a standstill.		P
	If one or more of the above conditions cannot be satisfied for technical reasons, measures must be taken to ensure that these operations can be carried out safely (see section 1.2.5).		N/A
	In the case of automated machinery and, where necessary, other machinery, a connecting device for mounting diagnostic fault-finding equipment must be provided.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Automated machinery components which have to be changed frequently must be capable of being removed and replaced easily and safely. Access to the components must enable these tasks to be carried out with the necessary technical means in accordance with a specified operating method.		N/A
1.6.2.	**Access to operating positions and servicing points**		--
	Machinery must be designed and constructed in such a way as to allow access in safety to all areas where intervention is necessary during operation, adjustment and maintenance of the machinery.		N/A
1.6.3.	**Isolation of energy sources**		--
	Machinery must be fitted with means to isolate it from all energy sources. Such isolators must be clearly identified. They must be capable of being locked if reconnection could endanger persons. Isolators must also be capable of being locked where an operator is unable, from any of the points to which he has access, to check that the energy is still cut off.	Battery powered	N/A
	In the case of machinery capable of being plugged into an electricity supply, removal of the plug is sufficient, provided that the operator can check from any of the points to which he has access that the plug remains removed.		N/A
	After the energy is cut off, it must be possible to dissipate normally any energy remaining or stored in the circuits of the machinery without risk to persons		N/A
	As an exception to the requirement laid down in the previous paragraphs, certain circuits may remain connected to their energy sources in order, for example, to hold parts, to protect information, to light interiors, etc. In this case, special steps must be taken to ensure operator safety.		N/A
1.6.4.	**Operator intervention**		--
	Machinery must be so designed, constructed and equipped that the need for operator intervention is limited. If operator intervention cannot be avoided, it must be possible to carry it out easily and safely.		P
1.6.5.	**Cleaning of internal parts**		--
	The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is impossible to avoid entering the machinery, it must be designed and constructed in such a way as to allow cleaning to take place safely.	Internal parts are not intended to be cleaned	N/A
1.7.	**INFORMATION**		--

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Clause	Requirement + Test	Result - Remark	Verdict
1.7.1.	**Information and warnings on the machinery**		--
	Information and warnings on the machinery should preferably be provided in the form of readily understandable symbols or pictograms. Any written or verbal information and warnings must be expressed in an official Community language or languages, which may be determined in accordance with the Treaty by the Member State in which the machinery is placed on the market and/or put into service and may be accompanied, on request, by versions in any other official Community language or languages understood by the operators.	English	P
1.7.1.1.	**Information and information devices**		--
	The information needed to control machinery must be provided in a form that is unambiguous and easily understood. It must not be excessive to the extent of overloading the operator.		P
	Visual display units or any other interactive means of communication between the operator and the machine must be easily understood and easy to use.		P
1.7.1.2.	**Warning devices**		--
	Where the health and safety of persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped in such a way as to give an appropriate acoustic or light signal as a warning.		N/A
	Where machinery is equipped with warning devices these must be unambiguous and easily perceived. The operator must have facilities to check the operation of such warning devices at all times.		N/A
	The requirements of the specific Community Directives concerning colours and safety signals must be complied with.		N/A
1.7.2.	**Warning of residual risks**		--
	Where risks remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted, the necessary warnings, including warning devices, must be provided.		N/A
1.7.3.	**Marking of machinery**		--
	All machinery must be marked visibly, legibly and indelibly with the following minimum particulars:		--
	- the business name and full address of the manufacturer and, where applicable, his authorised representative,	see marking plate	P
	- designation of the machinery	see marking plate	P
	- the CE Marking (see Annex III),	see marking plate	P
	- designation of series or type,	see marking plate	P
	- serial number, if any,	see marking plate	P

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	- the year of construction, that is the year in which the manufacturing process is completed.	see marking plate	P
	It is prohibited to pre-date or post-date the machinery when affixing the CE marking.		P
	Furthermore, machinery designed and constructed for use in a potentially explosive atmosphere must be marked accordingly.	Not for use in a potentially explosive atmosphere	N/A
	Machinery must also bear full information relevant to its type and essential for safe use. Such information is subject to the requirements set out in section 1.7.1.		P
	Where a machine part must be handled during use with lifting equipment, its mass must be indicated legibly, indelibly and unambiguously.		N/A
1.7.4.	**Instructions**		--
	All machinery must be accompanied by instructions in the official Community language or languages of the Member State in which it is placed on the market and/or put into service.	English	P
	The instructions accompanying the machinery must be either 'Original instructions' or a 'Translation of the original instructions', in which case the translation must be accompanied by the original instructions.	Original instructions	P
	By way of exception, the maintenance instructions intended for use by specialised personnel mandated by the manufacturer or his authorised representative may be supplied in only one Community language which the specialised personnel understand.		N/A
	The instructions must be drafted in accordance with the principles set out below.	See below	P
1.7.4.1.	**General principles for the drafting of instructions**		--
	a) The instructions must be drafted in one or more official Community languages. The words 'Original instructions' must appear on the language version(s) verified by the manufacturer or his authorised representative.		P
	b) Where no 'Original instructions' exist in the official language(s) of the country where the machinery is to be used, a translation into that/those language(s) must be provided by the manufacturer or his authorised representative or by the person bringing the machinery into the language area in question. The translations must bear the words 'Translation of the original instructions'.		N/A
	c) The contents of the instructions must cover not only the intended use of the machinery but also take into account any reasonably foreseeable misuse thereof.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	d) In the case of machinery intended for use by non-professional operators, the wording and layout of the instructions for use must take into account the level of general education and acumen that can reasonably be expected from such operators.		P
1.7.4.2.	**Contents of the instructions**		--
	Each instruction manual must contain, where applicable, at least the following information:		P
	a) the business name and full address of the manufacturer and of his authorised representative;		P
	b) the designation of the machinery as marked on the machinery itself, except for the serial number (see section 1.7.3);		P
	c) the EC declaration of conformity, or a document setting out the contents of the EC declaration of conformity, showing the particulars of the machinery, not necessarily including the serial number and the signature;		P
	d) a general description of the machinery;		P
	e) the drawings, diagrams, descriptions and explanations necessary for the use, maintenance and repair of the machinery and for checking its correct functioning;		P
	f) a description of the workstation(s) likely to be occupied by operators;		P
	g) a description of the intended use of the machinery;		P
	h) warnings concerning ways in which the machinery must not be used that experience has shown might occur;		P
	i) assembly, installation and connection instructions, including drawings, diagrams and the means of attachment and the designation of the chassis or installation on which the machinery is to be mounted;		P
	j) instructions relating to installation and assembly for reducing noise or vibration;		P
	k) instructions for the putting into service and use of the machinery and, if necessary, instructions for the training of operators;		P
	l) information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted;		P
	m) instructions on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided;		P
	n) the essential characteristics of tools which may be fitted to the machinery;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	o) the conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;		P
	p) instructions with a view to ensuring that transport, handling and storage operations can be made safely, giving the mass of the machinery and of its various parts where these are regularly to be transported separately;		P
	q) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;		P
	r) the description of the adjustment and maintenance operations that should be carried out by the user and the preventive maintenance measures that should be observed;		P
	s) instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations;		P
	t) the specifications of the spare parts to be used, when these affect the health and safety of operators;		P
	u) the following information on airborne noise emissions:		--
	- the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact must be indicated,	See the user manual	P
	- 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
	These values must be either those actually measured for the machinery in question or those established on the basis of measurements taken for technically comparable machinery which is representative of the machinery to be produced.		N/A
	In the case of very large machinery, instead of the A-weighted sound power level, the A-weighted emission sound pressure levels at specified positions around the machinery may be indicated.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery. Whenever sound emission values are indicated the uncertainties surrounding these values must be specified. The operating conditions of the machinery during measurement and the measuring methods used must be described.		N/A
	Where the workstation(s) are undefined or cannot be defined, A-weighted sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1,6 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated.		N/A
	Where specific Community Directives lay down other requirements for the measurement of sound pressure levels or sound power levels, those Directives must be applied and the corresponding provisions of this section shall not apply;		P
	v) where machinery is likely to emit non-ionising radiation which may cause harm to persons, in particular persons with active or non-active implantable medical devices, information concerning the radiation emitted for the operator and exposed persons.		N/A
1.7.4.3.	**Sales literature**		--
	Sales literature describing the machinery must not contradict the instructions as regards health and safety aspects. Sales literature describing the performance characteristics of machinery must contain the same information on emissions as is contained in the instructions.		P
2.	**SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR CERTAIN CATEGORIES OF MACHINERY**		--
	Foodstuffs machinery, machinery for cosmetics or pharmaceutical products, hand-held and/or hand-guided machinery, portable fixing and other impact machinery, machinery for working wood and material with similar physical characteristics must meet all the essential health and safety requirements described in this chapter (see General Principles, point 4).		--
2.1.	**FOODSTUFFS MACHINERY AND MACHINERY FOR COSMETICS OR PHARMACEUTICAL PRODUCTS**		--
2.1.1.	**General**		--
	Machinery intended for use with foodstuffs or with cosmetics or pharmaceutical products must be designed and constructed in such a way as to avoid any risk of infection, sickness or contagion.		N/A
	The following requirements must be observed:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	a) materials in contact with, or intended to come into contact with, foodstuffs or cosmetics or pharmaceutical products must satisfy the conditions set down in the relevant Directives. The machinery must be designed and constructed in such a way that these materials can be cleaned before each use. Where this is not possible disposable parts must be used;		N/A
	b) all surfaces in contact with foodstuffs or cosmetics or pharmaceutical products, other than surfaces of disposable parts, must:		N/A
	- be smooth and have neither ridges nor crevices which could harbour organic materials. The same applies to their joinings,		N/A
	- be designed and constructed in such a way as to reduce the projections, edges and recesses of assemblies to a minimum,		N/A
	- be easily cleaned and disinfected, where necessary after removing easily dismantled parts; the inside surfaces must have curves with a radius sufficient to allow thorough cleaning;		N/A
	c) it must be possible for liquids, gases and aerosols deriving from foodstuffs, cosmetics or pharmaceutical products as well as from cleaning, disinfecting and rinsing fluids to be completely discharged from the machinery (if possible, in a 'cleaning' position);		N/A
	d) machinery must be designed and constructed in such a way as to prevent any substances or living creatures, in particular insects, from entering, or any organic matter from accumulating in, areas that cannot be cleaned;		N/A
	e) machinery must be designed and constructed in such a way that no ancillary substances hazardous to health, including the lubricants used, can come into contact with foodstuffs, cosmetics or pharmaceutical products. Where necessary, machinery must be designed and constructed in such a way that continuing compliance with this requirement can be checked.		N/A
2.1.2.	**Instructions**		--
	The instructions for foodstuffs machinery and machinery for use with cosmetics or pharmaceutical products must indicate recommended products and methods for cleaning, disinfecting and rinsing, not only for easily accessible areas but also for areas to which access is impossible or inadvisable.		N/A
2.2.	**PORTABLE HAND-HELD AND/OR HAND-GUIDED MACHINERY**		--
2.2.1.	**General**		--
	Portable hand-held and/or hand-guided machinery must:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	- depending on the type of machinery, have a supporting surface of sufficient size and have a sufficient number of handles and supports of an appropriate size, arranged in such a way as to ensure the stability of the machinery under the intended operating conditions,		P
	- except where technically impossible, or where there is an independent control device, in the case of handles which cannot be released in complete safety, be fitted with manual start and stop control devices arranged in such a way that the operator can operate them without releasing the handles,		P
	- present no risks of accidental starting and/or continued operation after the operator has released the handles. Equivalent steps must be taken if this requirement is not technically feasible,		P
	- permit, where necessary, visual observation of the danger zone and of the action of the tool with the material being processed.	No danger zone	N/A
	The handles of portable machinery must be designed and constructed in such a way as to make starting and stopping straightforward.		P
2.2.1.1.	**Instructions**		--
	The instructions must give the following information concerning vibrations transmitted by portable handheld and hand-guided machinery:		P
	- the vibration total value to which the hand-arm system is subjected, if it exceeds 2,5 m/s². Where this value does not exceed 2,5 m/s². this must be mentioned,		P
	- the uncertainty of measurement.		P
	These values must be either those actually measured for the machinery in question or those established on the basis of measurements taken for technically comparable machinery which is representative of the machinery to be produced.		P
	If harmonised standards are not applied, the vibration data must be measured using the most appropriate measurement code for the machinery.		N/A
	The operating conditions during measurement and the methods used for measurement, or the reference of the harmonised standard applied, must be specified.		P
2.2.2.	**Portable fixing and other impact machinery**		--
2.2.2.1.	**General**		--
	Portable fixing and other impact machinery must be designed and constructed in such a way that:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- energy is transmitted to the impacted element by the intermediary component that does not leave the device,		N/A
	- an enabling device prevents impact unless the machinery is positioned correctly with adequate pressure on the base material,		N/A
	- involuntary triggering is prevented; where necessary, an appropriate sequence of actions on the enabling device and the control device must be required to trigger an impact,		N/A
	- accidental triggering is prevented during handling or in case of shock,		N/A
	- loading and unloading operations can be carried out easily and safely.		N/A
	Where necessary, it must be possible to fit the device with splinter guard(s) and the appropriate guard(s) must be provided by the manufacturer of the machinery.		N/A
2.2.2.2.	**Instructions**		--
	The instructions must give the necessary information regarding:		--
	- the accessories and interchangeable equipment that can be used with the machinery,		N/A
	- the suitable fixing or other impacted elements to be used with the machinery,		N/A
	- where appropriate, the suitable cartridges to be used.		N/A
2.3.	**MACHINERY FOR WORKING WOOD AND MATERIAL WITH SIMILAR PHYSICAL CHARACTERISTICS**		--
	Machinery for working wood and materials with similar physical characteristics must comply with the following requirements:		--
	a) the machinery must be designed, constructed or equipped in such a way that the piece being machined can be placed and guided in safety; where the piece is hand-held on a work-bench, the latter must be sufficiently stable during the work and must not impede the movement of the piece;		N/A
	b) where the machinery is likely to be used in conditions involving the risk of ejection of workpieces or parts of them, it must be designed, constructed, or equipped in such a way as to prevent such ejection, or, if this is not possible, so that the ejection does not engender risks for the operator and/or exposed persons;		N/A
	c) the machinery must be equipped with an automatic brake that stops the tool in a sufficiently short time if there is a risk of contact with the tool whilst it runs down;		N/A
	d) where the tool is incorporated into a non-fully automated machine, the latter must be designed and constructed in such a way as to eliminate or reduce the risk of accidental injury.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.	**SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO THE MOBILITY OF MACHINERY**		--
	Machinery presenting hazards due to its mobility must meet all the essential health and safety requirements described in this chapter (see General Principles, point 4).		P
3.1.	**GENERAL**		--
3.1.1.	**Definitions**		--
	a) Machinery presenting hazards due to its mobility' means		P
	- machinery the operation of which requires either mobility while working, or continuous or semicontinuous movement between a succession of fixed working locations, or	Hand-held appliance	P
	- machinery which is operated without being moved, but which may be equipped in such a way as to enable it to be moved more easily from one place to another.		N/A
	b) Driver' means an operator responsible for the movement of a machine. The driver may be transported by the machinery or may be on foot, accompanying the machinery, or may guide the machinery by remote control.		N/A
3.2.	**WORK POSITIONS**		--
3.2.1.	**Driving position**		--
	Visibility from the driving position must be such that the driver can, in complete safety for himself and the exposed persons, operate the machinery and its tools in their foreseeable conditions of use. Where necessary, appropriate devices must be provided to remedy hazards due to inadequate direct vision.		N/A
	Machinery on which the driver is transported must be designed and constructed in such a way that, from the driving positions, there is no risk to the driver from inadvertent contact with the wheels and tracks.		N/A
	The driving position of ride-on drivers must be designed and constructed in such a way that a driver's cab may be fitted, provided this does not increase the risk and there is room for it. The cab must incorporate a place for the instructions needed for the driver.		N/A
3.2.2.	**Seating**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Where there is a risk that operators or other persons transported by the machinery may be crushed between parts of the machinery and the ground should the machinery roll or tip over, in particular for machinery equipped with a protective structure referred to in section 3.4.3 or 3.4.4, their seats must be designed or equipped with a restraint system so as to keep the persons in their seats, without restricting movements necessary for operations or movements relative to the structure caused by the suspension of the seats. Such restraint systems should not be fitted if they increase the risk.		N/A
3.2.3.	**Positions for other persons**		--
	If the conditions of use provide that persons other than the driver may occasionally or regularly be transported by the machinery or work on it, appropriate positions must be provided which enable them to be transported or to work on it without risk.		N/A
	The second and third paragraphs of section 3.2.1 also apply to the places provided for persons other than the driver.		N/A
3.3.	**CONTROL SYSTEMS**		--
	If necessary, steps must be taken to prevent unauthorised use of controls.		N/A
	In the case of remote controls, each control unit must clearly identify the machinery to be controlled from that unit.		N/A
	The remote control system must be designed and constructed in such a way as to affect only:		--
	- the machinery in question		N/A
	- the functions in question.		N/A
	Remote controlled machinery must be designed and constructed in such a way that it will respond only to signals from the intended control units.		N/A
3.3.1.	**Control devices**		--
	The driver must be able to actuate all control devices required to operate the machinery from the driving position, except for functions which can be safely actuated only by using control devices located elsewhere. These functions include, in particular, those for which operators other than the driver are responsible or for which the driver has to leave the driving position in order to control them safely.		N/A
	Where there are pedals, they must be so designed, constructed and fitted as to allow safe operation by the driver with the minimum risk of incorrect operation. They must have a slip-resistant surface and be easy to clean.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Where their operation can lead to hazards, notably dangerous movements, the control devices, except for those with preset positions, must return to the neutral position as soon as they are released by the operator.		N/A
	In the case of wheeled machinery, the steering system must be designed and constructed in such a way as to reduce the force of sudden movements of the steering wheel or the steering lever caused by shocks to the guide wheels.		N/A
	Any control that locks the differential must be so designed and arranged that it allows the differential to be unlocked when the machinery is moving.		N/A
	The sixth paragraph of section 1.2.2, concerning acoustic and/or visual warning signals, applies only in the case of reversing.		N/A
3.3.2.	**Starting/moving**		--
	All travel movements of self-propelled machinery with a ride-on driver must be possible only if the driver is at the controls.		N/A
	Where, for operating purposes, machinery is fitted with devices which exceed its normal clearance zone (e.g. stabilisers, jib, etc.), the driver must be provided with the means of checking easily, before moving the machinery, that such devices are in a particular position which allows safe movement.		N/A
	This also applies to all other parts which, to allow safe movement, have to be in particular positions, locked if necessary.		N/A
	Where it does not give rise to other risks, movement of the machinery must depend on safe positioning of the aforementioned parts.		N/A
	It must not be possible for unintentional movement of the machinery to occur while the engine is being started.		N/A
3.3.3.	**Travelling function**		--
	Without prejudice to road traffic regulations, self-propelled machinery and its trailers must meet the requirements for slowing down, stopping, braking and immobilisation so as to ensure safety under all the operating, load, speed, ground and gradient conditions allowed for.		N/A
	The driver must be able to slow down and stop self-propelled machinery by means of a main device. Where safety so requires, in the event of a failure of the main device, or in the absence of the energy supply needed to actuate the main device, an emergency device with a fully independent and easily accessible control device must be provided for slowing down and stopping.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Where safety so requires, a parking device must be provided to render stationary machinery immobile. This device may be combined with one of the devices referred to in the second paragraph, provided that it is purely mechanical.		N/A
	Remote-controlled machinery must be equipped with devices for stopping operation automatically and immediately and for preventing potentially dangerous operation in the following situations:		N/A
	- if the driver loses control,		N/A
	- if it receives a stop signal,		N/A
	- if a fault is detected in a safety-related part of the system,		N/A
	- if no validation signal is detected within a specified time.		N/A
	Section 1.2.4 does not apply to the travelling function.		N/A
3.3.4.	**Movement of pedestrian-controlled machinery**		--
	Movement of pedestrian-controlled self-propelled machinery must be possible only through sustained action on the relevant control device by the driver. In particular, it must not be possible for movement to occur while the engine is being started.		N/A
	The control systems for pedestrian-controlled machinery must be designed in such a way as to minimise the risks arising from inadvertent movement of the machine towards the driver, in particular:		N/A
	- crushing,		N/A
	- injury from rotating tools.		N/A
	The speed of travel of the machinery must be compatible with the pace of a driver on foot.		N/A
	In the case of machinery on which a rotary tool may be fitted, it must not be possible to actuate the tool when the reverse control is engaged, except where the movement of the machinery results from movement of the tool. In the latter case, the reversing speed must be such that it does not endanger the driver.		N/A
3.3.5.	**Control circuit failure**		--
	A failure in the power supply to the power-assisted steering, where fitted, must not prevent machinery from being steered during the time required to stop it.	No power-assisted steering available	N/A
3.4.	**PROTECTION AGAINST MECHANICAL HAZARDS**		--
3.4.1.	Uncontrolled movements		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Machinery must be designed, constructed and where appropriate placed on its mobile support in such a way as to ensure that, when moved, uncontrolled oscillations of its centre of gravity do not affect its stability or exert excessive strain on its structure.		N/A
3.4.2.	**Moving transmission parts**		--
	By way of exception to section 1.3.8.1, in the case of engines, moveable guards preventing access to the moving parts in the engine compartment need not have interlocking devices if they have to be opened either by the use of a tool or key or by a control located in the driving position, providing the latter is in a fully enclosed cab with a lock to prevent unauthorised access.		N/A
3.4.3.	**Roll-over and tip-over**		--
	Where, in the case of self-propelled machinery with a ride-on driver, operator(s) or other person(s), there is a risk of rolling or tipping over, the machinery must be fitted with an appropriate protective structure, unless this increases the risk.		N/A
	This structure must be such that in the event of rolling or tipping over it affords the ride-on person(s) an adequate deflection-limiting volume.		N/A
	In order to verify that the structure complies with the requirement laid down in the second paragraph, the manufacturer or his authorised representative must, for each type of structure concerned, perform appropriate tests or have such tests performed.		N/A
3.4.4.	**Falling objects**		--
	Where, in the case of self-propelled machinery with a ride-on driver, operator(s) or other person(s), there is a risk due to falling objects or material, the machinery must be designed and constructed in such a way as to take account of this risk and fitted, if its size allows, with an appropriate protective structure.		N/A
	This structure must be such that, in the event of falling objects or material, it guarantees the ride-on person(s) an adequate deflection-limiting volume.		N/A
	In order to verify that the structure complies with the requirement laid down in the second paragraph, the manufacturer or his authorised representative must, for each type of structure concerned, perform appropriate tests or have such tests performed.		N/A
3.4.5.	**Means of access**		--
	Handholds and steps must be designed, constructed and arranged in such a way that the operators use them instinctively and do not use the control devices to assist access.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.4.6.	**Towing devices**		--
	All machinery used to tow or to be towed must be fitted with towing or coupling devices designed, constructed and arranged in such a way as to ensure easy and secure connection and disconnection and to prevent accidental disconnection during use.		N/A
	Insofar as the tow bar load so requires, such machinery must be equipped with a support with a bearing surface suited to the load and the ground.		N/A
3.4.7.	**Transmission of power between self-propelled machinery (or tractor) and recipient machinery**		--
	Removable mechanical transmission devices linking self-propelled machinery (or a tractor) to the first fixed bearing of recipient machinery must be designed and constructed in such a way that any part that moves during operation is protected over its whole length.		N/A
	On the side of the self-propelled machinery (or tractor), the power take-off to which the removable mechanical transmission device is attached must be protected either by a guard fixed and linked to the self-propelled machinery (or tractor) or by any other device offering equivalent protection.		N/A
	It must be possible to open this guard for access to the removable transmission device. Once it is in place, there must be enough room to prevent the drive shaft damaging the guard when the machinery (or the tractor) is moving.		N/A
	On the recipient machinery side, the input shaft must be enclosed in a protective casing fixed to the machinery.		N/A
	Torque limiters or freewheels may be fitted to universal joint transmissions only on the side adjoining the driven machinery. The removable mechanical transmission device must be marked accordingly.		N/A
	All recipient machinery, the operation of which requires a removable mechanical transmission device to connect it to self-propelled machinery (or a tractor), must have a system for attaching the removable mechanical transmission device so that, when the machinery is uncoupled, the removable mechanical transmission device and its guard are not damaged by contact with the ground or part of the machinery.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The outside parts of the guard must be so designed, constructed and arranged that they cannot turn with the removable mechanical transmission device. The guard must cover the transmission to the ends of the inner jaws in the case of simple universal joints and at least to the centre of the outer joint or joints in the case of wide-angle universal joints.		N/A
	If means of access to working positions are provided near to the removable mechanical transmission device, they must be designed and constructed in such a way that the shaft guards cannot be used as steps, unless designed and constructed for that purpose.		N/A
3.5.	**PROTECTION AGAINST OTHER HAZARDS**		--
3.5.1.	**Batteries**		--
	The battery housing must be designed and constructed in such a way as to prevent the electrolyte being ejected on to the operator in the event of rollover or tipover and to avoid the accumulation of vapours in places occupied by operators.		P
	The battery housing must be designed and constructed in such a way as to prevent the electrolyte being ejected on to the operator in the event of rollover or tipover and to avoid the accumulation of vapours in places occupied by operators.	Detachable battery	P
3.5.2.	**Fire**		--
	Depending on the hazards anticipated by the manufacturer, machinery must, where its size permits:		--
	- either allow easily accessible fire extinguishers to be fitted, or		N/A
	- be provided with built-in extinguisher systems.		N/A
3.5.3.	**Emissions of hazardous substances**		--
	The second and third paragraphs of section 1.5.13 do not apply where the main function of the machinery is the spraying of products. However, the operator must be protected against the risk of exposure to such hazardous emissions.		N/A
3.6.	**INFORMATION AND INDICATIONS**		--
3.6.1.	**Signs, signals and warnings**		--
	All machinery must have signs and/or instruction plates concerning use, adjustment and maintenance, wherever necessary, so as to ensure the health and safety of persons. They must be chosen, designed and constructed in such a way as to be clearly visible and indelible.		N/A
	Without prejudice to the provisions of road traffic regulations, machinery with a ride-on driver must have the following equipment:		--
	- an acoustic warning device to alert persons,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- a system of light signals relevant to the intended conditions of use; the latter requirement does not apply to machinery intended solely for underground working and having no electrical power,		N/A
	- where necessary, there must be an appropriate connection between a trailer and the machinery for the operation of signals.		N/A
	Remote-controlled machinery which, under normal conditions of use, exposes persons to the risk of impact or crushing must be fitted with appropriate means to signal its movements or with means to protect persons against such risks. The same applies to machinery which involves, when in use, the constant repetition of a forward and backward movement on a single axis where the area to the rear of the machine is not directly visible to the driver.		N/A
	Machinery must be constructed in such a way that the warning and signalling devices cannot be disabled unintentionally. Where it is essential for safety, such devices must be provided with the means to check that they are in good working order and their failure must be made apparent to the operator.		N/A
	Where the movement of machinery or its tools is particularly hazardous, signs on the machinery must be provided to warn against approaching the machinery while it is working; the signs must be legible at a sufficient distance to ensure the safety of persons who have to be in the vicinity.		N/A
3.6.2.	**Marking**		--
	The following must be shown legibly and indelibly on all machinery:		N/A
	- nominal power expressed in kilowatts (kW),		N/A
	- mass of the most usual configuration, in kilograms (kg);		N/A
	and, where appropriate:		--
	- maximum drawbar pull provided for at the coupling hook, in Newtons (N),		N/A
	- maximum vertical load provided for on the coupling hook, in Newtons (N).		N/A
3.6.3.	**Instructions**		--
3.6.3.1.	**Vibrations**		--
	The instructions must give the following information concerning vibrations transmitted by the machinery to the hand-arm system or to the whole body:		N/A
	- the vibration total value to which the hand-arm system is subjected, if it exceeds 2,5 m/s². Where this value does not exceed 2,5 m/s², this must be mentioned,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the highest root mean square value of weighted acceleration to which the whole body is subjected, if it exceeds 0,5 m/s². Where this value does not exceed 0,5 m/s², this must be mentioned,		N/A
	- the uncertainty of measurement		N/A
	- These values must be either those actually measured for the machinery in question or those established on the basis of measurements taken for technically comparable machinery which is representative of the machinery to be produced.		N/A
	Where harmonised standards are not applied, the vibration must be measured using the most appropriate measurement code for the machinery concerned.		N/A
	The operating conditions during measurement and the measurement codes used must be described.		N/A
3.6.3.2.	**Multiple uses**		--
	The instructions for machinery allowing several uses depending on the equipment used and the instructions for the interchangeable equipment must contain the information necessary for safe assembly and use of the basic machinery and the interchangeable equipment that can be fitted.		N/A
4.	**SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO LIFTING OPERATIONS**		--
	Machinery presenting hazards due to lifting operations must meet all the relevant essential health and safety requirements described in this chapter (see General Principles, point 4).	Not a machinery presenting hazards due to lifting operations, the whole section 4 not applicable	N/A
4.1.	**GENERAL**		--
4.1.1.	**Definitions**		--
4.1.2.	**Protection against mechanical hazards**		--
4.1.2.1.	**Risks due to lack of stability**		--
	Machinery must be designed and constructed in such a way that the stability required by section 1.3.1 is maintained both in service and out of service, including all stages of transportation, assembly and dismantling, during foreseeable component failures and also during the tests carried out in accordance with the instruction handbook. To that end, the manufacturer or his authorised representative must use the appropriate verification methods.		N/A
4.1.2.2.	**Machinery running on guide rails and rail tracks**		--
	Machinery must be provided with devices which act on the guide rails or tracks to prevent derailment.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If, despite such devices, there remains a risk of derailment or of failure of a rail or of a running component, devices must be provided which prevent the equipment, component or load from falling or the machinery from overturning.		N/A
4.1.2.3.	**Mechanical strength**		--
	Machinery, lifting accessories and their components must be capable of withstanding the stresses to which they are subjected, both in and, where applicable, out of use, under the installation and operating conditions provided for and in all relevant configurations, with due regard, where appropriate, to the effects of atmospheric factors and forces exerted by persons. This requirement must also be satisfied during transport, assembly and dismantling.		N/A
	Machinery and lifting accessories must be designed and constructed in such a way as to prevent failure from fatigue and wear, taking due account of their intended use.		N/A
	The materials used must be chosen on the basis of the intended working environments, with particular regard to corrosion, abrasion, impacts, extreme temperatures, fatigue, brittleness and ageing.		N/A
	Machinery and lifting accessories must be designed and constructed in such a way as to withstand the overload in the static tests without permanent deformation or patent defect. Strength calculations must take account of the value of the static test coefficient chosen to guarantee an adequate level of safety. That coefficient has, as a general rule, the following values:		N/A
	a) manually-operated machinery and lifting accessories: 1,5;		N/A
	b) other machinery: 1,25.		N/A
	Machinery must be designed and constructed in such a way as to undergo, without failure, the dynamic tests carried out using the maximum working load multiplied by the dynamic test coefficient. This dynamic test coefficient is chosen so as to guarantee an adequate level of safety: the coefficient is, as a general rule, equal to 1,1. As a general rule, the tests will be performed at the nominal speeds provided for. Should the control circuit of the machinery allow for a number of simultaneous movements, the tests must be carried out under the least favourable conditions, as a general rule by combining the movements concerned.		N/A
4.1.2.4.	**Pulleys, drums, wheels, ropes and chains**		--
	Pulleys, drums and wheels must have a diameter commensurate with the size of the ropes or chains with which they can be fitted.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Drums and wheels must be designed, constructed and installed in such a way that the ropes or chains with which they are equipped can be wound without coming off.		N/A
	Ropes used directly for lifting or supporting the load must not include any splicing other than at their ends. Splicings are, however, tolerated in installations which are intended by design to be modified regularly according to needs of use.		N/A
	Complete ropes and their endings must have a working coefficient chosen in such a way as to guarantee an adequate level of safety. As a general rule, this coefficient is equal to 5.		N/A
	Lifting chains must have a working coefficient chosen in such a way as to guarantee an adequate level of safety. As a general rule, this coefficient is equal to 4.		N/A
	In order to verify that an adequate working coefficient has been attained, the manufacturer or his authorised representative must, for each type of chain and rope used directly for lifting the load and for the rope ends, perform the appropriate tests or have such tests performed.		N/A
4.1.2.5.	**Lifting accessories and their components**		--
	Lifting accessories and their components must be sized with due regard to fatigue and ageing processes for a number of operating cycles consistent with their expected life-span as specified in the operating conditions for a given application.		N/A
	Moreover:		--
	a) the working coefficient of wire-rope/rope-end combinations must be chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 5. Ropes must not comprise any splices or loops other than at their ends;		N/A
	b) where chains with welded links are used, they must be of the short-link type. The working coefficient of chains must be chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 4;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) the working coefficient for textile ropes or slings is dependent on the material, method of manufacture, dimensions and use. This coefficient must be chosen in such a way as to guarantee an adequate level of safety; it is, as a general rule, equal to 7, provided the materials used are shown to be of very good quality and the method of manufacture is appropriate to the intended use. Should this not be the case, the coefficient is, as a general rule, set at a higher level in order to secure an equivalent level of safety. Textile ropes and slings must not include any knots, connections or splicing other than at the ends of the sling, except in the case of an endless sling;		N/A
	d) all metallic components making up, or used with, a sling must have a working coefficient chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 4;		N/A
	e) the maximum working load of a multilegged sling is determined on the basis of the working coefficient of the weakest leg, the number of legs and a reduction factor which depends on the slinging configuration;		N/A
	f) in order to verify that an adequate working coefficient has been attained, the manufacturer or his authorised representative must, for each type of component referred to in (a), (b), (c) and (d), perform the appropriate tests or have such tests performed.		N/A
4.1.2.6.	**Control of movements**		--
	Devices for controlling movements must act in such a way that the machinery on which they are installed is kept safe.		N/A
	a) Machinery must be designed and constructed or fitted with devices in such a way that the amplitude of movement of its components is kept within the specified limits. The operation of such devices must, where appropriate, be preceded by a warning.		N/A
	b) Where several fixed or rail-mounted machines can be manoeuvred simultaneously in the same place, with risks of collision, such machinery must be designed and constructed in such a way as to make it possible to fit systems enabling these risks to be avoided.		N/A
	c) Machinery must be designed and constructed in such a way that the loads cannot creep dangerously or fall freely and unexpectedly, even in the event of partial or total failure of the power supply or when the operator stops operating the machine.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	d) It must not be possible, under normal operating conditions, to lower the load solely by friction brake, except in the case of machinery whose function requires it to operate in that way.		N/A
	e) Holding devices must be designed and constructed in such a way that inadvertent dropping of the loads is avoided.		N/A
4.1.2.7.	**Movements of loads during handling**		--
	The operating position of machinery must be located in such a way as to ensure the widest possible view of trajectories of the moving parts, in order to avoid possible collisions with persons, equipment or other machinery which might be manoeuvring at the same time and liable to constitute a hazard.		N/A
	Machinery with guided loads must be designed and constructed in such a way as to prevent persons from being injured by movement of the load, the carrier or the counterweights, if any.		N/A
4.1.2.8.	**Machinery serving fixed landings**		--
4.1.2.8.1.	**Movements of the carrier**		--
	The movement of the carrier of machinery serving fixed landings must be rigidly guided to and at the landings. Scissor systems are also regarded as rigid guidance.		N/A
4.1.2.8.2.	**Access to the carrier**		--
	Where persons have access to the carrier, the machinery must be designed and constructed in such a way as to ensure that the carrier remains stationary during access, in particular while it is being loaded or unloaded.		N/A
	The machinery must be designed and constructed in such a way as to ensure that the difference in level between the carrier and the landing being served does not create a risk of tripping.		N/A
4.1.2.8.3.	**Risks due to contact with the moving carrier**		--
	Where necessary in order to fulfil the requirement expressed in the second paragraph of section 4.1.2.7, the travel zone must be rendered inaccessible during normal operation.		N/A
	When, during inspection or maintenance, there is a risk that persons situated under or above the carrier may be crushed between the carrier and any fixed parts, sufficient free space must be provided either by means of physical refuges or by means of mechanical devices blocking the movement of the carrier.		N/A
4.1.2.8.4.	**Risk due to the load falling off the carrier**		--
	Where there is a risk due to the load falling off the carrier, the machinery must be designed and constructed in such a way as to prevent this risk.		N/A
4.1.2.8.5.	**Landings**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Risks due to contact of persons at landings with the moving carrier or other moving parts must be prevented.		N/A
	Where there is a risk due to persons falling into the travel zone when the carrier is not present at the landings, guards must be fitted in order to prevent this risk. Such guards must not open in the direction of the travel zone. They must be fitted with an interlocking device controlled by the position of the carrier that prevents:		N/A
	- hazardous movements of the carrier until the guards are closed and locked,		N/A
	- hazardous opening of a guard until the carrier has stopped at the corresponding landing.		N/A
4.1.3.	**Fitness for purpose**		--
	When lifting machinery or lifting accessories are placed on the market or are first put into service, the manufacturer or his authorised representative must ensure, by taking appropriate measures or having them taken, that the machinery or the lifting accessories which are ready for use — whether manually or power-operated — can fulfil their specified functions safely.		N/A
	The static and dynamic tests referred to in section 4.1.2.3 must be performed on all lifting machinery ready to be put into service.		N/A
	Where the machinery cannot be assembled in the manufacturer's premises or in the premises of his authorised representative, the appropriate measures must be taken at the place of use. Otherwise, the measures may be taken either in the manufacturer's premises or at the place of use.		N/A
4.2.	**REQUIREMENTS FOR MACHINERY WHOSE POWER SOURCE IS OTHER THAN MANUAL EFFORT**		--
4.2.1.	**Control of movements**		--
	Hold-to-run control devices must be used to control the movements of the machinery or its equipment. However, for partial or complete movements in which there is no risk of the load or the machinery colliding, the said devices may be replaced by control devices authorising automatic stops at pre-selected positions without the operator holding a hold-to-run control device.		N/A
4.2.2.	**Loading control**		--
	Machinery with a maximum working load of not less than 1 000 kilograms or an overturning moment of not less than 40 000 Nm must be fitted with devices to warn the driver and prevent dangerous movements in the event:		N/A
	- of overloading, either as a result of the maximum working load or the maximum working moment due to the load being exceeded, or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- of the overturning moment being exceeded..		N/A
4.2.3.	**Installations guided by ropes**		--
	Rope carriers, tractors or tractor carriers must be held by counterweights or by a device allowing permanent control of the tension.		N/A
4.3.	**INFORMATION AND MARKINGS**		--
4.3.1.	**Chains, ropes and webbing**		--
	Each length of lifting chain, rope or webbing not forming part of an assembly must bear a mark or, where this is not possible, a plate or irremovable ring bearing the name and address of the manufacturer or his authorised representative and the identifying reference of the relevant certificate.		N/A
	The certificate mentioned above must show at least the following information:		N/A
	a) the name and address of the manufacturer and, if appropriate, his authorised representative;		N/A
	b) a description of the chain or rope which includes:		N/A
	- its nominal size,		N/A
	- its construction,		N/A
	- the material from which it is made, and		N/A
	- any special metallurgical treatment applied to the material;		N/A
	c) the test method used;		N/A
	d) the maximum load to which the chain or rope should be subjected in service. A range of values may be given on the basis of the intended applications.		N/A
4.3.2.	**Lifting accessories**		--
	Lifting accessories must show the following particulars:		N/A
	- identification of the material where this information is needed for safe use,		N/A
	- the maximum working load.		N/A
	In the case of lifting accessories on which marking is physically impossible, the particulars referred to in the first paragraph must be displayed on a plate or other equivalent means and securely affixed to the accessory.		N/A
	The particulars must be legible and located in a place where they are not liable to disappear as a result of wear or jeopardise the strength of the accessory.		N/A
4.3.3.	**Lifting machinery**		--
	The maximum working load must be prominently marked on the machinery. This marking must be legible, indelible and in an un-coded form.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the maximum working load depends on the configuration of the machinery, each operating position must be provided with a load plate indicating, preferably in diagrammatic form or by means of tables, the working load permitted for each configuration.		N/A
	Machinery intended for lifting goods only, equipped with a carrier which allows access to persons, must bear a clear and indelible warning prohibiting the lifting of persons. This warning must be visible at each place where access is possible.		N/A
4.4.	**INSTRUCTIONS**		--
4.4.1.	**Lifting accessories**		--
	Each lifting accessory or each commercially indivisible batch of lifting accessories must be accompanied by instructions setting out at least the following particulars:		N/A
	a) the intended use;		N/A
	b) the limits of use (particularly for lifting accessories such as magnetic or vacuum pads which do not fully comply with section 4.1.2.6(e));		N/A
	c) instructions for assembly, use and maintenance;		N/A
	d) the static test coefficient used.		N/A
4.4.2.	**Lifting machinery**		--
	Lifting machinery must be accompanied by instructions containing information on:		N/A
	a) the technical characteristics of the machinery, and in particular:		--
	- the maximum working load and, where appropriate, a copy of the load plate or load table described in the second paragraph of section 4.3.3,		N/A
	- the reactions at the supports or anchors and, where appropriate, characteristics of the tracks,		N/A
	- where appropriate, the definition and the means of installation of the ballast;		N/A
	b) the contents of the logbook, if the latter is not supplied with the machinery;		N/A
	c) advice for use, particularly to offset the lack of direct vision of the load by the operator;		N/A
	d) where appropriate, a test report detailing the static and dynamic tests carried out by or for the manufacturer or his authorised representative;		N/A
	e) for machinery which is not assembled on the premises of the manufacturer in the form in which it is to be used, the necessary instructions for performing the measures referred to in section 4.1.3 before it is first put into service.		N/A
5.	**SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY INTENDED FOR UNDERGROUND WORK**		--

Directive 2006/42/EC-Annex I			
Clause	Requirement + Test	Result - Remark	Verdict
	Machinery intended for underground work must meet all the essential health and safety requirements described in this chapter (see General Principles, point 4)	Not intended for underground work, whole section 5 not applicable	N/A
5.1.	**RISKS DUE TO LACK OF STABILITY**		--
	Powered roof supports must be designed and constructed in such a way as to maintain a given direction when moving and not slip before and while they come under load and after the load has been removed. They must be equipped with anchorages for the top plates of the individual hydraulic props.		N/A
5.2.	**MOVEMENT**		--
	Powered roof supports must allow for unhindered movement of persons.		N/A
5.3.	**CONTROL DEVICES**		--
	The accelerator and brake controls for movement of machinery running on rails must be hand-operated. However, enabling devices may be foot-operated.		N/A
	The control devices of powered roof supports must be designed and positioned in such a way that, during displacement operations, operators are sheltered by a support in place. The control devices must be protected against any accidental release.		N/A
5.4.	**STOPPING**		--
	Self-propelled machinery running on rails for use in underground work must be equipped with an enabling device acting on the circuit controlling the movement of the machinery such that movement is stopped if the driver is no longer in control of the movement.		N/A
5.5.	**FIRE**		--
	The second indent of section 3.5.2 is mandatory in respect of machinery which comprises highly flammable parts.		N/A
	The braking system of machinery intended for use in underground workings must be designed and constructed in such a way that it does not produce sparks or cause fires.		N/A
	Machinery with internal combustion engines for use in underground workings must be fitted only with engines using fuel with a low vaporising pressure and which exclude any spark of electrical origin.		N/A
5.6.	**EXHAUST EMISSIONS**		--
	Exhaust emissions from internal combustion engines must not be discharged upwards.		N/A
6.	**SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY PRESENTING PARTICULAR HAZARDS DUE TO THE LIFTING OF PERSONS**		--

Directive 2006/42/EC-Annex I			
Clause	Requirement + Test	Result - Remark	Verdict
	Machinery presenting hazards due to the lifting of persons must meet all the relevant essential health and safety requirements described in this chapter (see General Principles, point 4).	not a machinery presenting hazards due to the lifting of persons, whole section 6 not applicable	N/A
6.1.	**GENERAL**		--
6.1.1.	**Mechanical strength**		--
	The carrier, including any trapdoors, must be designed and constructed in such a way as to offer the space and strength corresponding to the maximum number of persons permitted on the carrier and the maximum working load.		N/A
	The working coefficients for components set out in sections 4.1.2.4 and 4.1.2.5 are inadequate for machinery intended for the lifting of persons and must, as a general rule, be doubled. Machinery intended for lifting persons or persons and goods must be fitted with a suspension or supporting system for the carrier designed and constructed in such a way as to ensure an adequate overall level of safety and to prevent the risk of the carrier falling.		N/A
	If ropes or chains are used to suspend the carrier, as a general rule, at least two independent ropes or chains are required, each with its own anchorage.		N/A
6.1.2.	**Loading control for machinery moved by power other than human strength**		--
	The requirements of section 4.2.2 apply regardless of the maximum working load and overturning moment, unless the manufacturer can demonstrate that there is no risk of overloading or overturning.		N/A
6.2.	**CONTROL DEVICES**		--
	Where safety requirements do not impose other solutions, the carrier must, as a general rule, be designed and constructed in such a way that persons in the carrier have means of controlling upward and downward movements and, if appropriate, other movements of the carrier.		N/A
	In operation, those control devices must override any other devices controlling the same movement with the exception of emergency stop devices.		N/A
	The control devices for these movements must be of the hold-to-run type except where the carrier itself is completely enclosed.		N/A
6.3.	**RISKS TO PERSONS IN OR ON THE CARRIER**		--
6.3.1.	**Risks due to movements of the carrier**		--
	Machinery for lifting persons must be designed, constructed or equipped in such a way that the acceleration or deceleration of the carrier does not engender risks for persons.		N/A
6.3.2.	**Risk of persons falling from the carrier**		--

Directive 2006/42/EC-Annex I			
Clause	Requirement + Test	Result - Remark	Verdict
	The carrier must not tilt to an extent which creates a risk of the occupants falling, including when the machinery and carrier are moving.		N/A
	Where the carrier is designed as a work station, provision must be made to ensure stability and to prevent hazardous movements.		N/A
	If the measures referred to in section 1.5.15 are not adequate, carriers must be fitted with a sufficient number of suitable anchorage points for the number of persons permitted on the carrier. The anchorage points must be strong enough for the use of personal protective equipment against falls from a height.		N/A
	Any trapdoor in floors or ceilings or side doors must be designed and constructed in such a way as to prevent inadvertent opening and must open in a direction that obviates any risk of falling, should they open unexpectedly.		N/A
6.3.3.	**Risk due to objects falling on the carrier**		--
	Where there is a risk of objects falling on the carrier and endangering persons, the carrier must be equipped with a protective roof.		N/A
6.4.	**MACHINERY SERVING FIXED LANDINGS**		--
6.4.1.	**Risks to persons in or on the carrier**		--
	The carrier must be designed and constructed in such a way as to prevent risks due to contact between persons and/or objects in or on the carrier with any fixed or moving elements. Where necessary in order to fulfil this requirement, the carrier itself must be completely enclosed with doors fitted with an interlocking device that prevents hazardous movements of the carrier unless the doors are closed. The doors must remain closed if the carrier stops between landings where there is a risk of falling from the carrier.		N/A
	The machinery must be designed, constructed and, where necessary, equipped with devices in such a way as to prevent uncontrolled upward or downward movement of the carrier. These devices must be able to Stopp the carrier at its maximum working load and at the foreseeable maximum speed.		N/A
	The stopping action must not cause deceleration harmful to the occupants, whatever the load conditions.		N/A
6.4.2.	**Controls at landings**		--
	Controls, other than those for emergency use, at landings must not initiate movements of the carrier when:		N/A
	- the control devices in the carrier are being operated,		N/A
	- the carrier is not at a landing.		N/A

Directive 2006/42/EC-Annex I			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.3.	**Access to the carrier**		--
	The guards at the landings and on the carrier must be designed and constructed in such a way as to ensure safe transfer to and from the carrier, taking into consideration the foreseeable range of goods and persons to be lifted.		N/A
6.5.	**MARKINGS**		--
	The carrier must bear the information necessary to ensure safety including:		N/A
	- the number of persons permitted on the carrier,		N/A
	- the maximum working load.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

6	**Risk reduction**		--
6.1	**General**		--
	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;		P
	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
6.2	**Inherently safe design measures**		--
6.2.1	**General**		--
	Inherently safe design measures are the first and most important step in the risk reduction process. This is because protective measures inherent to the characteristics of the machine are likely to remain effective, whereas experience has shown that even well-designed safeguarding can fail or be violated and information for use may not be followed.		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**		--
6.2.2.1	**Geometrical factors**		--
	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, for example — and choosing and locating means of indirect vision where necessary (mirrors, etc.) so as to take into account the characteristics of human vision, particularly when safe operation requires permanent direct control by the operator, for example:	No danger zone	P
	- the travelling and working area of mobile machines;		N/A
	- the zone of movement of lifted loads or of the carrier of machinery for lifting persons;		N/A
	- the area of contact of the tool of a hand-held or hand-guided machine with the material being worked.		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	b) The form and the relative location of the mechanical components parts: for instance, crushing and shearing hazards are avoided by increasing the minimum gap between the moving parts, such that the part of the body under consideration can enter the gap safely, or by reducing the gap so that no part of the body can enter it (see ISO 13854 and ISO 13857).		P
	c) Avoiding sharp edges and corners, protruding parts: in so far as their purpose allows, accessible parts of the machinery shall have no sharp edges, no sharp angles, no rough surfaces, no protruding parts likely to cause injury, and no openings which can “trap” parts of the body or clothing. In particular, sheet metal edges shall be deburred, flanged or trimmed, and open ends of tubes which can cause a “trap” shall be capped.		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**		--
	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
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing		P
	1) noise emission at source (see ISO/TR 11688-1),		P
	2) the emission of vibration at source, such as redistribution or addition of mass and changes of process parameters [for example, frequency and/or amplitude of movements (for hand-held and hand-guided machinery, see CR 1030-1)],		P
	3) the emission of hazardous substances, including the use of less hazardous substances or dust-reducing processes (granules instead of powders, milling instead of grinding), and		P
	4) radiation emissions, including, for example, avoiding the use of hazardous radiation sources, limiting the power of radiation to the lowest level sufficient for the proper functioning of the machine, designing the source so that the beam is concentrated on the target, increasing the distance between the source and the operator or providing for remote operation of the machinery [measures for reducing emission of non-ionizing radiation are given in 6.3.4.5 (see also EN 12198-1 and EN 12198-3)].		P
6.2.3	**Taking into account general technical knowledge of machine design**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	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 such as		P
	- stress limitation by implementation of correct calculation, construction and fastening methods as regards, for example, bolted assemblies and welded assemblies,		P
	- stress limitation by overload prevention (bursting disk, pressure-limiting valves, breakage points, torque-limiting devices, etc.),		P
	- avoiding fatigue in elements under variable stresses (notably cyclic stresses), and		P
	- static and dynamic balancing of rotating elements,		P
	b) materials and their properties such as		P
	- resistance to corrosion, ageing, abrasion and wear,		P
	- hardness, ductility, brittleness,		P
	- homogeneity,		P
	- toxicity, and		P
	- flammability, and		P
	c) emission values for		P
	- noise,		P
	- vibration,		P
	- hazardous substances, and		P
	- radiation.		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**		--
	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:		N/A
	a) on machines intended for use in explosive atmospheres, using	Not used in explosive atmosphere	N/A
	- appropriately selected pneumatic or hydraulic control system and machine actuators,		N/A
	- intrinsically safe electrical equipment (see IEC 60079-11);		N/A
	b) for particular products to be processed (for example, by a solvent), by using equipment that ensures the temperature will remain far below the flash point;		N/A
	c) the use of alternative equipment to avoid high noise levels, such as		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- electrical instead of pneumatic equipment,		N/A
	- in certain conditions, water-cutting instead of mechanical equipment.		N/A
6.2.5	**Applying principle of positive mechanical action**		--
	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. An example of this is positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119).		N/A
6.2.6	**Provisions for stability**		--
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use. Factors to be taken into account include	Hand-held tool	N/A
	- the geometry of the base,		N/A
	- the weight distribution, including loading,		N/A
	- the dynamic forces due to movements of parts of the machine, of the machine itself or of elements held by the machine which can result in an overturning moment,		N/A
	- vibration,		N/A
	- oscillations of the centre of gravity,		N/A
	- characteristics of the supporting surface in case of travelling or installation on different sites (ground conditions, slope, etc.), and		N/A
	- external forces, such as wind pressure and manual forces.		N/A
	Stability shall be considered in all phases of the life cycle of the machine, including handling, travelling, installation, use, dismantling, disabling and scrapping.		N/A
	Other protective measures for stability relevant to safeguarding are given in 6.3.2.6.		N/A
6.2.7	**Provisions for maintainability**		--
	When designing a machine, the following maintainability factors shall be taken into account to enable maintenance of the machine:		P
	- accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used;		P
	- ease of handling, taking into account human capabilities;		P
	- limitation of the number of special tools and equipment.		P
6.2.8	**Observing ergonomic principles**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	The designer's attention is particularly drawn to following ergonomic aspects of machine design.		P
	a) Avoid the necessity for stressful postures and movements during the use of the machine (for example, providing facilities to adjust the machine to suit the various operators).		P
	b) Design machines, especially hand-held and mobile machines, so as to enable them to be operated easily, taking into account human effort, actuation of controls and hand, arm and leg anatomy.		P
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatures.		P
	d) Avoid linking the operator's working rhythm to an automatic succession of cycles.		P
	e) Provide local lighting on or in the machine for the illumination of the working area and of adjusting, setting-up and frequent maintenance zones when the design features of the machine and/or its guards render the ambient lighting inadequate. Flicker, dazzling, shadows and stroboscopic effects shall be avoided if they can cause a risk. If the position or the lighting source has to be adjusted, its location shall be such that it does not cause any risk to persons making the adjustment.		P
	f) Select, locate and identify manual controls (actuators) so that		P
	- they are clearly visible and identifiable, and appropriately marked where necessary (see 6.4.4),		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- they can be safely operated without hesitation or loss of time and without ambiguity (for example, a standard layout of controls reduces the possibility of error when an operator changes from a machine to another one of similar type having the same pattern of operation),		P
	- their location (for push-buttons) and their movement (for levers and hand wheels) are consistent with their effect (see IEC 61310-3), and		P
	- their operation cannot cause additional risk.		P
	Where a control is designed and constructed to perform several different actions — namely, where there is no one-to-one correspondence (for example, keyboards) — the action to be performed shall be clearly displayed and subject to confirmation where necessary.	No such control	N/A
	Controls shall be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Constraints due to the necessary or foreseeable use of personal protective equipment (such as footwear, gloves) shall be taken into account.		P
	g) Select, design and locate indicators, dials and visual display units so that		P
	- they fit within the parameters and characteristics of human perception,		P
	- information displayed can be detected, identified and interpreted conveniently, i.e. long-lasting, distinct, unambiguous and understandable with respect to the operator's requirements and the intended use, and		P
	- the operator is able to perceive them from the control position.		P
6.2.9	**Electrical hazards**		P
	For the design of the electrical equipment of machines, IEC 60204-1 gives general provisions about disconnection and switching of electrical circuits and for protection against electric shock. For requirements related to specific machines, see corresponding IEC standards (for example, IEC 61029, IEC 60745 or IEC 60335).	Battery operated	P
6.2.10	**Pneumatic and hydraulic hazards**		--
	Pneumatic and hydraulic equipment of machinery shall be designed so that	No pneumatic and hydraulic device, whole section 6.2.10 not applicable	N/A
	- the maximum rated pressure cannot be exceeded in the circuits (using, for example, pressure-limiting devices),		N/A
	- no hazard results from pressure fluctuations or increases, or from loss of pressure or vacuum,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- no hazardous fluid jet or sudden hazardous movement of the hose (whiplash) results from leakage or component failures,		N/A
	- air receivers, air reservoirs or similar vessels (such as in gas-loaded accumulators) comply with the applicable design standard codes or regulations for these elements,		N/A
	- all elements of the equipment, especially pipes and hoses, are protected against harmful external effects,		N/A
	- as far as possible, reservoirs and similar vessels (for example, gas-loaded accumulators) are automatically depressurized when isolating the machine from its power supply (see 6.3.5.4) and, if not possible, means are provided for their isolation, local depressurizing and pressure indication (see also ISO 14118:2000, Clause 5), and		N/A
	- all elements which remain under pressure after isolation of the machine from its power supply are provided with clearly identified exhaust devices, and there is a warning label drawing attention to the necessity of depressurizing those elements before any setting or maintenance activity on the machine.		N/A
6.2.11	**Applying inherently safe design measures to control systems**		--
6.2.11.1	**General**		--
	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
	Typical causes of hazardous machine behaviour are		P
	- an unsuitable design or modification (accidental or deliberate) of the control system logic,		P
	- a temporary or permanent defect or failure of one or several components of the control system,		P
	- a variation or a failure in the power supply of the control system, and		P
	- inappropriate selection, design and location of the control devices.		P
	Typical examples of hazardous machine behaviour are		P
	- unexpected start-up (see ISO 14118),		P
	- uncontrolled speed change,		P
	- failure to stop moving parts,		P
	- dropping or ejection of part of the machine or of a workpiece clamped by the machine, and		N/A

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	- machine action resulting from inhibition (defeating or failure) of protective devices.		P
	In order to prevent hazardous machine behaviour and to achieve safety functions, the design of control systems shall comply with the principles and methods presented in this subclause (6.2.11) and in 6.2.12. These principles and methods shall be applied singly or in combination as appropriate to the circumstances (see ISO 13849-1, IEC 60204-1 and IEC 62061).		P
	Control systems shall be designed to enable the operator to interact with the machine safely and easily. This requires one or several of the following solutions:		P
	- systematic analysis of start and stop conditions;		P
	- provision for specific operating modes (for example, start-up after normal stop, restart after cycle interruption or after emergency stop, removal of the workpieces contained in the machine, operation of a part of the machine in case of a failure of a machine element);		P
	- clear display of the faults;		P
	- measures to prevent accidental generation of unexpected start commands (for example, shrouded start device) likely to cause dangerous machine behaviour (see ISO 14118:2000, Figure 1);		P
	- maintained stop commands (for example, interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000, Figure 1).		P
	An assembly of machines may be divided into several zones for emergency stopping, for stopping as a result of protective devices and/or for isolation and energy dissipation. The different zones shall be clearly defined and it shall be obvious which parts of the machine belong to which zone. Likewise, it shall be obvious which control devices (for example, emergency stop devices, supply disconnecting devices) and/or protective devices belong to which zone. The interfaces between zones shall be designed such that no function in one zone creates hazards in another zone which has been stopped for an intervention.		P
	Control systems shall be designed to limit the movements of parts of the machinery, the machine itself, or workpieces and/or loads held by the machinery, to the safe design parameters (for example, range, speed, acceleration, deceleration, load capacity). Allowance shall be made for dynamic effects (swinging of loads, etc.).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the travelling speed of mobile pedestrian controlled machinery other than remote-controlled shall be compatible with walking speed;		N/A
	- the range, speed, acceleration and deceleration of movements of the person-carrier and carrying vehicle for lifting persons shall be limited to non-hazardous values, taking into account the total reaction time of the operator and the machine;		N/A
	- the range of movements of parts of machinery for lifting loads shall be kept within specified limits.		N/A
	When the machinery contains various elements that can be operated independently, the control system shall be designed to prevent risks arising out of a lack of coordination (for example, collision prevention system).		N/A
6.2.11.2	**Starting of an internal power source/switching on an external power supply**		--
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.		P
	- starting the internal combustion engine shall not lead to movement of a mobile machine;		N/A
	- connection to mains electricity supply shall not result in the starting of working parts of a machine.		N/A
6.2.11.3	**Starting/stopping of a mechanism**		--
	The primary action for starting or accelerating the movement of a mechanism should be performed by the application or an increase of voltage or fluid pressure, or — if binary logic elements are considered — by passage from state 0 to state 1 (where state 1 represents the highest energy state).	No movable mechanism	N/A
	The primary action for stopping or slowing down should be performed by removal or reduction of voltage or fluid pressure, or — if binary logic elements are considered — by passage from state 1 to state 0 (where state 1 represents the highest energy state).		N/A
	In certain applications, such as high-voltage switchgear, this principle cannot be followed, in which case other measures should be applied to achieve the same level of confidence for the stopping or slowing down.		N/A
	When, in order for the operator to maintain permanent control of deceleration, this principle is not observed (for example, a hydraulic braking device of a self-propelled mobile machine), the machine shall be equipped with a means of slowing and stopping in case of failure of the main braking system.		N/A
6.2.11.4	**Restart after power interruption**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	If a hazard could be generated, the spontaneous restart of a machine when it is re-energized after power interruption shall be prevented (for example, by use of a self-maintained relay, contactor or valve).	No such hazards	N/A
6.2.11.5	**Interruption of power supply**		--
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply. At least the following requirements shall be met:		P
	- the stopping function of the machinery shall remain;		P
	- all devices whose permanent operation is required for safety shall operate in an effective way to maintain safety (for example, locking, clamping devices, cooling or heating devices, power-assisted steering of self-propelled mobile machinery);		P
	- parts of machinery or workpieces and/or loads held by machinery which are liable to move as a result of potential energy shall be retained for the time necessary to allow them to be safely lowered.		P
6.2.11.6	**Use of automatic monitoring**		--
	Automatic monitoring is intended to ensure that a safety function or functions implemented by a protective measure do not fail to be performed if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed such that hazards are generated.		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. In either case, the protective measure can be initiated immediately or delayed until a specific event occurs (for example, the beginning of the machine cycle).		N/A
	The protective measure may be, for example,		N/A
	- the stopping of the hazardous process,		N/A
	- preventing the restart of this process after the first stop following the failure, or		N/A
	- the triggering of an alarm.		N/A
6.2.11.7	**Safety functions implemented by programmable electronic control systems**		--
6.2.11.7.1	**General**		--

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	A control system that includes programmable electronic equipment (for example, programmable controllers) can, where appropriate, be used to implement safety functions at machinery. Where a programmable electronic control system is used, it is necessary to consider its performance requirements in relation to the requirements for the safety functions. The design of the programmable electronic control system shall be such that the probability of random hardware failures and the likelihood of systematic failures that can adversely affect the performance of the safety-related control function(s) is sufficiently low. Where a programmable electronic control system performs a monitoring function, the system behaviour on detection of a fault shall be considered (see also the IEC 61508 series for further guidance).		N/A
	The programmable electronic control system should be installed and validated to ensure that the specified performance [for example, safety integrity level (SIL) in IEC 61508] for each safety function has been achieved. Validation comprises testing and analysis (for example, static, dynamic or failure analysis) to show that all parts interact correctly to perform the safety function and that unintended functions do not occur.		N/A
6.2.11.7.2	**Hardware aspects**		--
	The hardware (including, for example, sensors, actuators and logic solvers) shall be selected, and/or designed and installed, to meet both the functional and performance requirements of the safety function(s) to be performed, in particular, by means of		N/A
	- architectural constraints (the configuration of the system, its ability to tolerate faults, its behaviour on detection of a fault, etc.),		N/A
	- selection, and/or design, of equipment and devices with an appropriate probability of dangerous random hardware failure, and		N/A
	- the incorporation of measures and techniques within the hardware so as to avoid systematic failures and control systematic faults.		N/A
6.2.11.7.3	**Software aspects**		--
	The software, including internal operating software (or system software) and application software, shall be designed so as to satisfy the performance specification for the safety functions (see also IEC 61508-3).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Application software should not be reprogrammable by the user. This may be achieved by use of embedded software in a non-reprogrammable memory [for example, micro-controller, application-specific integrated circuit (ASIC)].		N/A
	When the application requires reprogramming by the user, the access to the software dealing with safety functions should be restricted (for example, by locks or passwords for the authorized persons).		N/A
6.2.11.8	**Principles relating to manual control**		--
	These are as follows.		--
	a) Manual control devices shall be designed and located according to the relevant ergonomic principles given in 6.2.8, item f).		P
	b) A stop control device shall be placed near each start control device. Where the start/stop function is performed by means of a hold-to-run control, a separate stop control device shall be provided when a risk can result from the hold-to-run control device failing to deliver a stop command when released.		P
	c) Manual controls shall be located out of reach of the danger zones (see IEC 61310-3), except for certain controls where, of necessity, they are located within a danger zone, such as emergency stop or teach pendant.	No danger zone	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
	1) The driver of a ride-on mobile machine shall be able to actuate all control devices required to operate the machine from the driving position, except for functions which can be controlled more safely from other positions.		N/A
	2) On machinery intended for lifting persons, controls for lifting and lowering and, if appropriate, for moving the carrier shall generally be located in the carrier. If safe operation requires controls to be situated outside the carrier, the operator in the carrier shall be provided with the means of preventing hazardous movements.		N/A
	e) If it is possible to start the same hazardous element by means of several controls, the control circuit shall be so arranged that only one control is effective at a given time. This applies especially to machines which can be manually controlled by means of, among others, a portable control unit (such as a teach pendant), with which the operator can enter danger zones.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	f) Control actuators shall be designed or guarded so that their effect, where a risk is involved, cannot occur without intentional operation (see ISO 9355-1, ISO 9355-3 and ISO 447).		P
	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 (for example, by the design and location of control devices).		P
	h) For cableless control, an automatic stop shall be performed when correct control signals are not received, including loss of communication (see IEC 60204-1).		N/A
6.2.11.9	**Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance**		--
	Where, for setting, teaching, process changeover, fault-finding, cleaning or maintenance of machinery, a guard has to be displaced or removed and/or a protective device has to be disabled, and where it is necessary for the purpose of these operations for the machinery or part of the machinery to be put into operation, the safety of the operator shall be achieved using a specific control mode which simultaneously	No such control	N/A
	a) disables all other control modes,		N/A
	b) permits operation of the hazardous elements only by continuous actuation of an enabling device, a two-hand control device or a hold-to-run control device,		N/A
	c) permits operation of the hazardous elements only in reduced risk conditions (for example, reduced speed, reduced power/force, step-by-step, for example, with a limited movement control device), and		N/A
	d) prevents any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.		N/A
	This control mode shall be associated with one or more of the following measures:		N/A
	- restriction of access to the danger zone as far as possible;		N/A
	- emergency stop control within immediate reach of the operator;		N/A
	- portable control unit (teach pendant) and/or local controls (allowing sight of the controlled elements).		N/A
6.2.11.10	**Selection of control and operating modes**		--

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	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)**		--
	For guidance on electromagnetic compatibility, see IEC 60204-1 and IEC 61000-6.		P
6.2.11.12	**Provision of diagnostic systems to aid fault-finding**		--
	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**		--
6.2.12.1	**General**		--
	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
	The continued operation of the safety functions is essential for the safe use of the machine. This can be achieved by the measures given in 6.2.12.2 to 6.2.12.4.		P
6.2.12.2	**Use of reliable components**		--
	“Reliable components” means components which are capable of withstanding all disturbances and stresses associated with the usage of the equipment in the conditions of intended use (including the environmental conditions), for the period of time or the number of operations fixed for the use, with a low probability of failures generating a hazardous malfunctioning of the machine. Components shall be selected taking into account all factors mentioned above (see also 6.2.13).		P
6.2.12.3	**Use of “oriented failure mode” components**		--
	“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.		P
	The use of such components should always be considered, particularly in cases where redundancy (see 6.2.12.4) is not employed.		P
6.2.12.4	**Duplication (or redundancy) of components or subsystems**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	In the design of safety-related parts of the machine, duplication (or redundancy) of components may be used so that, if one component fails, another component or components continue to perform the respective function(s), thereby ensuring that the safety function remains available.	No such components	N/A
	In order to allow the proper action to be initiated, component failure shall be detected by automatic monitoring (see 6.2.11.6) or in some circumstances by regular inspection, provided that the inspection interval is shorter than the expected lifetime of the components.		N/A
	Diversity of design and/or technology can be used to avoid common cause failures (for example, from electromagnetic disturbance) or common mode failures.		N/A
6.2.13	**Limiting exposure to hazards through reliability of equipment**		--
	Increased reliability of all component parts of machinery reduces the frequency of incidents requiring intervention, thereby reducing exposure to hazards.		N/A
	This applies to power systems (operative part, see Annex A) as well as to control systems, and to safety functions as well as to other functions of machinery.		N/A
	Safety-related components (for example, certain sensors) of known reliability shall be used.		N/A
	The elements of guards and of protective devices shall be especially reliable, as their failure can expose persons to hazards, and also because poor reliability would encourage attempts to defeat them.		N/A
6.2.14	**Limiting exposure to hazards through mechanization or automation of loading (feeding) / unloading (removal) operations**		--
	Mechanization and automation of machine loading/unloading operations and, more generally, of handling operations — of workpieces, materials or substances — limits the risk generated by these operations by reducing the exposure of persons to hazards at the operating points.	No such operations	N/A
	Automation can be achieved by, for example, robots, handling devices, transfer mechanisms and air-blast equipment. Mechanization can be achieved by, for example, feeding slides, push-rods and hand-operated indexing tables.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	While automatic feeding and removal devices have much to offer in preventing accidents to machine operators, they can create danger when any faults are being corrected. Care shall be taken to ensure that the use of these devices does not introduce further hazards, such as trapping or crushing, between the devices and parts of the machine or workpieces/materials being processed. Suitable safeguards (see 6.3) shall be provided if this cannot be ensured.		N/A
	Automatic feeding and removal devices with their own control systems and the control system of the associated machine shall be interconnected after thorough study of how all safety functions are performed in all the control and operation modes of the entire equipment.		N/A
6.2.15	**Limiting exposure to hazards through location of setting and maintenance points outside danger zones**		--
	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.	Not such machine	N/A
6.3	**Safeguarding and complementary protective measures**		--
6.3.1	**General**		--
	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. Complementary protective measures involving additional equipment (for example, emergency stop equipment) may have to be implemented.		P
	Certain safeguards may be used to avoid exposure to more than one hazard.		P
6.3.2	**Selection and implementation of guards and protective devices**		--
6.3.2.1	**General**		--
6.3.2.2	**Where access to the hazard zone is not required during normal operation**		--
	Where access to the hazard zone is not required during normal operation of the machinery, safeguards should be selected from the following:		P
	a) fixed guards (see also ISO 14120)		P
	b) interlocking guards with or without guard locking (see also 6.3.3.2.3, ISO 14119 and ISO 14120)		N/A
	c) self-closing guards (see ISO 14120:2002, 3.3.2)		N/A
	d) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496) or pressure-sensitive protective devices (see ISO 13856).		N/A
6.3.2.3	**Where access to the hazard zone is required during normal operation**		--

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	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 (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this document);		N/A
	b) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496);		N/A
	c) adjustable guards;		N/A
	d) self-closing guards (see ISO 14120:2002, 3.3.2);		N/A
	e) two-hand control devices (see ISO 13851);		N/A
	f) interlocking guards with a start function (control guard) (see 6.3.3.2.5).		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**		--
	As far as possible, machines shall be designed so that the safeguards provided for the protection of the production operator also ensure the protection of personnel carrying out setting, teaching, process changeover, fault-finding, cleaning or maintenance, without hindering them in the performance of their task. Such tasks shall be identified and considered in the risk assessment as parts of the use of the machine (see 5.2).		N/A
6.3.2.5	**Selection and implementation of sensitive protective equipment**		--
6.3.2.5.1	**Selection**		--
	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
	Types of sensitive protective equipment include		N/A
	- light curtains,		N/A
	- scanning devices, for example, laser scanners,		N/A
	- pressure-sensitive mats, and		N/A
	- trip bars, trip wires.		N/A
	Sensitive protective equipment can be used		N/A
	- for tripping purposes,		N/A
	- for presence sensing,		N/A
	- for both tripping and presence sensing, or		N/A
	- to re-initiate machine operation — a practice subject to stringent conditions.		N/A
	The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:		N/A
	- tendency for the machinery to eject materials or component parts;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- necessity to guard against emissions (noise, radiation, dust, etc.);		N/A
	- erratic or excessive machine stopping time;		N/A
	- inability of a machine to stop part-way through a cycle.		N/A
6.3.2.5.2	**Implementation**		--
	Consideration should be given to		N/A
	a) the size, characteristics and positioning of the detection zone (see ISO 13855, which deals with the positioning of some types of sensitive protective equipment),		N/A
	b) the reaction of the device to fault conditions (see IEC 61496 for electrosensitive protective equipment),		N/A
	c) the possibility of circumvention, and		N/A
	d) detection capability and its variation over the course of time (as a result, for example, of its susceptibility to different environmental conditions such as the presence of reflecting surfaces, other artificial light sources and sunlight or impurities in the air).		N/A
	Sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that		N/A
	- a command is given as soon as a person or part of a person is detected,		N/A
	- the withdrawal of the person or part of a person detected does not, by itself, restart the hazardous machine function(s), and therefore the command given by the sensitive protective equipment is maintained by the control system until a new command is given,		N/A
	- restarting the hazardous machine function(s) results from the voluntary actuation by the operator of a control device placed outside the hazard zone, where this zone can be observed by the operator,		N/A
	- the machine cannot operate during interruption of the detection function of the sensitive protective equipment, except during muting phases, and		N/A
	- the position and the shape of the detection field prevents, possibly together with fixed guards, a person or part of a person from entering or being present in the hazard zone without being detected.		N/A
	For detailed consideration of the fault behaviour of, for example, active optoelectronic protective devices, IEC 61496 should be taken into account.		N/A
6.3.2.5.3	**Additional requirements for sensitive protective equipment when used for cycle initiation**		--

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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
	Cycle initiation by sensitive protective equipment shall be subject to the following conditions:		N/A
	a) only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used;		N/A
	b) the requirements for an AOPD used as a tripping and presence-sensing device (see IEC 61496) are satisfied — in particular, location, minimum distance (see ISO 13855), detection capability, reliability and monitoring of control and braking systems;		N/A
	c) the cycle time of the machine is short and the facility to re-initiate the machine upon clearing of the sensing field is limited to a period commensurate with a single normal cycle;		N/A
	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;		N/A
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPDs is capable of cycle re-initiation;		N/A
	f) with regard to the higher risk resulting from automatic cycle initiation, the AOPD and the associated control system comply with a higher safety-related performance than under normal conditions.		N/A
6.3.2.6	**Protective measures for stability**		--
	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 such as		N/A
	- anchorage bolts,		N/A
	- locking devices,		N/A
	- movement limiters or mechanical stops,		N/A
	- acceleration or deceleration limiters,		N/A
	- load limiters, and		N/A
	- alarms warning of the approach to stability or tipping limits.		N/A
6.3.2.7	**Other protective devices**		--

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Clause	Requirement + Test	Result - Remark	Verdict
	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, in particular		N/A
	- when the operator has insufficient visibility of the hazard zone,		N/A
	- when the operator lacks knowledge of the actual value of a safety-related parameter (distance, speed, mass, angle, etc.), and		N/A
	- when hazards can result from operations other than those controlled by the operator.		N/A
	The necessary devices include		N/A
	a) devices for limiting parameters of movement (distance, angle, velocity, acceleration),		N/A
	b) overloading and moment limiting devices,		N/A
	c) devices to prevent collisions or interference with other machines,		N/A
	d) devices for preventing hazards to pedestrian operators of mobile machinery or other pedestrians,		N/A
	e) torque limiting devices, and breakage points to prevent excessive stress of components and assemblies,		N/A
	f) devices for limiting pressure or temperature,		N/A
	g) devices for monitoring emissions,		N/A
	h) devices to prevent operation in the absence of the operator at the control position,		N/A
	i) devices to prevent lifting operations unless stabilizers are in place,		N/A
	j) devices to limit inclination of the machine on a slope, and		N/A
	k) devices to ensure that components are in a safe position before travelling.		N/A
	Automatic protective measures triggered by such devices that take operation of the machinery out of the control of the operator (for example, automatic stop of hazardous movement) should be preceded or accompanied by a warning signal to enable the operator to take appropriate action (see 6.4.3).		N/A
6.3.3	**Requirements for design of guards and protective devices**		--
6.3.3.1	**General requirements**		--

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	Guards and protective devices shall		P
	a) be of robust construction,		P
	b) not give rise to any additional hazard,		P
	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**		--
6.3.3.2.1	**Functions of guards**		--
	The functions that guards can achieve are		P
	- prevention of access to the space enclosed by the guard, and/or		P
	- containment/capture of materials, workpieces, chips, liquids which can be ejected or dropped by the machine, and reduction of emissions (noise, radiation, hazardous substances such as dust, fumes, gases) that can be generated by the machine.		N/A
	Additionally, they could need to have particular properties relating to electricity, temperature, fire, explosion, vibration, visibility (see ISO 14120) and operator position ergonomics (for example, usability, operator's movements, postures, repetitive movements).		N/A
6.3.3.2.2	**Requirements for fixed guards**		--
	Fixed guards shall be securely held in place either		P
	- permanently (for example by welding), or		P
	- by means of fasteners (screws, nuts) making removal/opening impossible without using tools; they should not remain closed without their fasteners (see ISO 14120).		P
6.3.3.2.3	**Requirements for movable guards**		--

EN ISO 12100:2010			
Clause	Requirement + Test	Result - Remark	Verdict
	Movable guards which provide protection against hazards generated by moving transmission parts shall		N/A
	a) as far as possible when open remain fixed to the machinery or other structure (generally by means of hinges or guides), and		N/A
	b) be interlocking (with guard locking when necessary) (see ISO 14119).		N/A
	Movable guards against hazards generated by non-transmission moving parts shall be designed and associated with the machine control system so that		N/A
	- moving parts cannot start up while they are within the operator's reach and the operator cannot reach moving parts once they have started up, with this able to be achieved by interlocking guards, with guard locking when necessary,		N/A
	- they can be adjusted only by an intentional action, such as the use of a tool or a key, and		N/A
	- the absence or failure of one of their components either prevents starting of the moving parts or stops them, with this able to be achieved by automatic monitoring (see 6.2.11.6).		N/A
6.3.3.2.4	**Requirements for adjustable guards**		--
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed.		N/A
	Manually adjustable guards shall be		N/A
	- designed so that the adjustment remains fixed during a given operation, and		N/A
	- readily adjustable without the use of tools.		N/A
6.3.3.2.5	**Requirements for interlocking guards with a start function (control guards)**		--
	An interlocking guard with a start function may only be used provided that		N/A
	a) all requirements for interlocking guards are satisfied (see ISO 14119),		N/A
	b) the cycle time of the machine is short,		N/A
	c) the maximum opening time of the guard is preset to a low value (for example, equal to the cycle time) and, when this time is exceeded, the hazardous function(s) cannot be initiated by the closing of the interlocking guard with a start function and resetting is necessary before restarting the machine,		N/A
	d) the dimensions or shape of the machine do not allow a person, or part of a person, to stay in the hazard zone or between the hazard zone and the guard while the guard is closed (see ISO 14120),		N/A
	e) all other guards, whether fixed (removable type) or movable, are interlocking guards,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	f) the interlocking device associated with the interlocking guard with a start function is designed such that — for example, by duplication of position detectors and use of automatic monitoring (see 6.2.11.6) — its failure cannot lead to an unintended/unexpected start-up, and		N/A
	g) the guard is securely held open (for example, by a spring or counterweight) such that it cannot initiate a start while falling by its own weight.		N/A
6.3.3.2.6	**Hazards from guards**		--
	Care shall be taken to prevent hazards which could be generated by		P
	- the guard construction (sharp edges or corners, material, noise emission, etc.),		P
	- the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall).		N/A
6.3.3.3	**Technical characteristics of protective devices**		--
	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
	Protective devices shall be selected on the basis of their having met the appropriate product standard (for example, IEC 61496 for active optoelectronic protective devices) or shall be designed according to one or several of the principles formulated in ISO 13849-1 or IEC 62061.		N/A
	Protective devices shall be installed and connected to the control system so that they cannot be easily Defeated.		N/A
6.3.3.4	**Provisions for alternative types of safeguards**		--
	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**		--
6.3.4.1	**General**		--
	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**		--
	Additional protective measures against noise include		P
	- enclosures (see ISO 15667),		P
	- screens fitted to the machine, and		N/A
	- silencers (see ISO 14163).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.4.3	**Vibration**		--
	Additional protective measures against vibration include		P
	- vibration isolators, such as damping devices placed between the source and the exposed person,		P
	- resilient mounting, and		P
	- suspended seats.		N/A
	For measures for vibration isolation of stationary industrial machinery see EN 1299.		N/A
6.3.4.4	**Hazardous substances**		--
	Additional protective measures against hazardous substances include		N/A
	- encapsulation of the machine (enclosure with negative pressure),		N/A
	- local exhaust ventilation with filtration,		N/A
	- wetting with liquids, and		N/A
	- special ventilation in the area of the machine (air curtains, cabins for operators).		N/A
6.3.4.5	**Radiation**		--
	Additional protective measures against radiation include		P
	- use of filtering and absorption, and		P
	- use of attenuating screens or guards.		P
6.3.5	**Complementary protective measures**		--
6.3.5.1	**General**		--
	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. Such measures include, but are not limited to, those dealt with in 6.3.5.2 to 6.3.5.6.		P
6.3.5.2	**Components and elements to achieve emergency stop function**		--
	If, following a risk assessment, a machine needs to be fitted with components and elements to achieve an emergency stop function for enabling actual or impending emergency situations to be averted, the following requirements apply:		N/A
	- the actuators shall be clearly identifiable, clearly visible and readily accessible;		N/A
	- the hazardous process shall be stopped as quickly as possible without creating additional hazards, but if this is not possible or the risk cannot be reduced, it should be questioned whether implementation of an emergency stop function is the best solution;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.		N/A
	Once active operation of the emergency stop device has ceased following an emergency stop command, the effect of this command shall be sustained until it is reset. This reset shall be possible only at the location where the emergency stop command has been initiated. The reset of the device shall not restart the machinery, but shall only permit restarting.		N/A
	More details for the design and selection of electrical components and elements to achieve the emergency stop function are provided in IEC 60204.		N/A
6.3.5.3	**Measures for the escape and rescue of trapped persons**		--
	Measures for the escape and rescue of trapped persons may consist, among others, of		N/A
	- escape routes and shelters in installations generating operator-trapping hazards,		N/A
	- arrangements for moving some elements by hand, after an emergency stop,		N/A
	- arrangements for reversing the movement of some elements,		N/A
	- anchorage points for descender devices,		N/A
	- means of communication to enable trapped operators to call for help.		N/A
6.3.5.4	**Measures for isolation and energy dissipation**		--
	Machines shall be equipped with the technical means to achieve isolation from power supply(ies) and dissipation of stored energy by means of the following actions:	Powered by the detachable battery.	N/A
	a) isolating (disconnecting, separating) the machine (or defined parts of the machine) from all power supplies;		N/A
	b) locking (or otherwise securing) all the isolating units in the isolating position;		N/A
	c) dissipating or, if this is not possible or practicable, restraining (containing) any stored energy which can give rise to a hazard;		N/A
	d) verifying, by means of safe working procedures, that the actions taken according to a), b) and c) above have produced the desired effect.		N/A
6.3.5.5	**Provisions for easy and safe handling of machines and their heavy component parts**		--
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	These attachments may be, among others,		N/A
	- standardized lifting appliances with slings, hooks, eyebolts, or tapped holes for appliance fixing,		N/A
	- appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground,		N/A
	- fork locating devices for machines to be transported by a lift truck,		N/A
	- lifting and stowing gear and appliances integrated into the machine.		N/A
	Parts of machinery which can be removed manually in operation shall be provided with means for their safe removal and replacement.		N/A
6.3.5.6	**Measures for safe access to machinery**		--
	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.	Hand-held power tool	N/A
	Where this is not possible, machines shall have built-in platforms, stairs or other facilities to provide safe access for those tasks; however, care should be taken to ensure that such platforms or stairs do not give access to danger zones of machinery.		N/A
	The walking areas shall be made from materials which remain as slip resistant as practicable under working conditions and, depending on the height from the ground, shall be provided with suitable guard-rails (see ISO 14122-3).		N/A
	In large automated installations, particular attention shall be given to safe means of access, such as walkways, conveyor bridges or crossover points.		N/A
	Means of access to parts of machinery located at height shall be provided with collective means of protection against falls (for example, guard-rails for stairways, stepladders and platforms and/or safety cages for ladders). As necessary, anchorage points for personal protective equipment against falls from height shall also be provided (for example, in carriers of machinery for lifting persons or with elevating control stations).		N/A
	Openings shall, whenever possible, open towards a safe position. They shall be designed to prevent hazards due to unintended opening.		N/A
	The necessary aids for access shall be provided (steps, handholds, etc.). Control devices shall be designed and located to prevent their being used as aids for access.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When machinery for lifting goods and/or persons includes landings at fixed levels, these shall be equipped with interlocking guards for preventing falls when the platform is not present at a level. Movement of the lifting platform shall be prevented while the guards are open.		N/A
6.4	**Information for use**		--
6.4.1	**General requirements**		--
6.4.1.1	Drafting information for use is an integral part of the design of a machine (see Figure 2). Information for use consists of communication links, such as texts, words, signs, signals, symbols or diagrams, used separately or in combination to convey information to the user. Information for use is intended for professional and/or non-professional users.		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
	The information shall indicate, as appropriate,		P
	- the need for training,		P
	- the need for personal protective equipment, and		P
	- the possible need for additional guards or protective devices (see Figure 2, Footnote d).		P
	It shall not exclude uses of the machine that can reasonably be expected from its designation and description and shall also warn about the risk which would result from using the machine in other ways than the ones described in the information, especially considering its reasonably foreseeable misuse.		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**		--
	Depending on the risk, the time when the information is needed by the user and the machine design, it shall be decided whether the information — or parts thereof — are to be given		P
	a) in/on the machine itself (see 6.4.3 and 6.4.4),		P
	b) in accompanying documents (in particular instruction handbook, see 6.4.5),		P
	c) on the packaging,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	d) by other means such as signals and warnings outside the machine.		P
6.4.3	**Signals and warning devices**		--
	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 (see 6.3.2.7).		N/A
	It is essential that these signals		N/A
	a) be emitted before the occurrence of the hazardous event,		N/A
	b) be unambiguous,		N/A
	c) be clearly perceived and differentiated from all other signals used, and		N/A
	d) be clearly recognized by the operator and other persons.		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.		N/A
6.4.4	**Markings, signs (pictograms) and written warnings**		--
	Machinery shall bear all markings which are necessary	Refer to the marking plate	P
	a) for its unambiguous identification, including at least	Refer to the marking plate	P
	1) the name and address of the manufacturer,	Refer to the marking plate	P
	2) the designation of series or type, and	Refer to the marking plate	P
	3) the serial number, if any,	Refer to the marking plate	P
	b) in order to indicate its compliance with mandatory requirements, comprising	Refer to the marking plate	P
	1) marking, and	Refer to the marking plate	P
	2) written indications, such as the authorized representative of the manufacturer, designation of the machinery, year of construction, and intended use in potentially explosive atmospheres),	Refer to the marking plate	P
	c) for its safe use, for example,		P
	1) maximum speed of rotating parts,		N/A
	2) maximum diameter of tools,		N/A
	3) mass (in kilograms) of the machine itself and/or of removable parts,		P
	4) maximum working load,		P
	5) necessity of wearing personal protective equipment,		P

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Clause	Requirement + Test	Result - Remark	Verdict
	6) guard adjustment data, and		N/A
	7) frequency of inspection.		N/A
	Information printed directly on the machine should be permanent and remain legible throughout the expected life of the machine.		P
	Signs or written warnings indicating only “Danger” shall not be used.		N/A
	Markings, signs and written warnings shall be readily understandable and unambiguous, especially as regards the part of the function(s) of the machine to which they are related. Readily understandable signs (pictograms) should be used in preference to written warnings.		P
	Signs and pictograms should only be used if they are understood in the culture in which the machinery is to be used.		P
	Written warnings shall be drawn up in the language(s) of the country in which the machine will be used for the first time and, on request, in the language(s) understood by operators.		N/A
	Markings shall comply with recognized standards (for example, ISO 2972 or ISO 7000, for pictograms, symbols and colours in particular).		P
	See IEC 60204-1 as regards marking of electrical equipment.		P
	See ISO 4413 and ISO 4414 for hydraulic and pneumatic equipment.		N/A
6.4.5	**Accompanying documents (in particular — instruction handbook)**		--
6.4.5.1	**Contents**		--
	The instruction handbook or other written instructions (for example, on the packaging) shall contain, among others, the following:		P
	a) information relating to transport, handling and storage of the machine, such as		P
	1) storage conditions for the machine,		P
	2) dimensions, mass value(s), position of the centre(s) of gravity, and		P
	3) indications for handling (for example, drawings indicating application points for lifting equipment);		P
	b) information relating to installation and commissioning of the machine, such as		P
	1) fixing/anchoring and dampening of noise and vibration requirements,		N/A
	2) assembly and mounting conditions,		P
	3) space needed for use and maintenance,		N/A
	4) permissible environmental conditions (for example, temperature, moisture, vibration, electromagnetic radiation),		P

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Clause	Requirement + Test	Result - Remark	Verdict
	5) instructions for connecting the machine to power supply (particularly on protection against electrical overloading),		N/A
	6) advice on waste removal/disposal, and		N/A
	7) if necessary, recommendations related to protective measures which have to be implemented by the user — for example, additional safeguards (see Figure 2, Footnote d), safety distances, safety signs and signals;		N/A
	c) information relating to the machine itself, such as		P
	1) detailed description of the machine, its fittings, guards and/or protective devices,		P
	2) the comprehensive range of applications for which the machine is intended, including prohibited usages, if any, taking into account variations of the original machine if appropriate,		P
	3) diagrams (especially schematic representation of safety functions),		P
	4) data on noise and vibration generated by the machine, and on radiation, gases, vapours and dust emitted by it, with reference to the measuring methods (including measurement uncertainties) used,		P
	5) technical documentation of electrical equipment (see IEC 60204), and		P
	6) documents attesting that the machine complies with mandatory requirements;		P
	d) information relating to the use of the machine, such as that related to or describing		P
	1) intended use,		P
	2) manual controls (actuators),		P
	3) setting and adjustment,		P
	4) modes and means for stopping (especially emergency stop),		P
	5) risks which could not be eliminated by the protective measures implemented by the designer,		N/A
	6) particular risks which can be generated by certain applications, by the use of certain fittings, and about specific safeguards necessary for such applications,		N/A
	7) reasonably foreseeable misuse and prohibited applications,		P
	8) fault identification and location, for repair and for restarting after an intervention, and		P
	9) personal protective equipment needed to be used and the training that is required;		P
	e) information for maintenance, such as		P

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Clause	Requirement + Test	Result - Remark	Verdict
	1) the nature and frequency of inspections for safety functions,		P
	2) specification of the spare parts to be used when these can affect the health and safety of operators,		N/A
	3) instructions relating to maintenance operations which require a definite technical knowledge or particular skills and hence need to be carried out exclusively by skilled persons (for example, maintenance staff, specialists),	Skilled person is not required	N/A
	4) instructions relating to maintenance actions (replacement of parts, etc.) which do not require specific skills and hence may be carried out by users (for example, operators), and		P
	5) drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks);		P
	f) information relating to dismantling, disabling and scrapping;		P
	g) information for emergency situations, such as		N/A
	1) the operating method to be followed in the event of accident or breakdown,		N/A
	2) the type of fire-fighting equipment to be used, and		N/A
	3) a warning of possible emission or leakage of hazardous substance(s) and, if possible, an indication of means for fighting their effects;		N/A
	h) maintenance instructions provided for skilled persons [item e) 3) above] and maintenance instructions provided for unskilled persons [item e) 4) above], that need to appear clearly separated from each other.		N/A
6.4.5.2	**Production of instruction handbook**		--
	The following applies to the production and presentation of the instruction handbook.		P
	a) The type fount and size of print shall ensure the best possible legibility. Safety warnings and/or cautions should be emphasized by the use of colours, symbols and/or large print.		P
	b) The information for use shall be given in the language(s) of the country in which the machine will be used for the first time and in the original version. If more than one language is to be used, each should be readily distinguished from another, and efforts should be made to keep the translated text and relevant illustration together.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Whenever helpful to the understanding, text should be supported by illustrations. These illustrations should be supplemented with written details enabling, for example, manual controls (actuators) to be located and identified. They should not be separated from the accompanying text and should follow sequential operations.		N/A
	d) Consideration should be given to presenting information in tabular form where this will aid understanding. Tables should be adjacent to the relevant text.		N/A
	e) The use of colours should be considered, particularly in relation to components requiring quick identification.		P
	f) When information for use is lengthy, a table of contents and/or an index should be provided.		P
	g) Safety-relevant instructions which involve immediate action should be provided in a form readily available to the operator.		P
6.4.5.3	**Drafting and editing information for use**		--
	The following applies to the drafting and editing of information for use.		P
	a) Relationship to model: the information shall clearly relate to the specific model of machine and, if necessary, other appropriate identification (for example, by serial number).		P
	b) Communication principles: when information for use is being prepared, the communication process “see – think – use” should be followed in order to achieve the maximum effect and should follow sequential operations. The questions, “How?” and “Why?” should be anticipated and the answers provided.		P
	c) Information for use shall be as simple and as brief as possible, and should be expressed in consistent terms and units with a clear explanation of unusual technical terms.		P
	d) When it is foreseen that a machine will be put to non-professional use, the instructions should be written in a form that is readily understood by the non-professional user. If personal protective equipment is required for the safe use of the machine, clear advice should be given, for example, on the packaging as well as on the machine, so that this information is prominently displayed at the point of sale.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	e) Durability and availability of the documents: documents giving instructions for use should be produced in durable form (i.e. they should be able to survive frequent handling by the user). It can be useful to mark them “keep for future reference”. Where information for use is kept in electronic form (CD, DVD, tape, hard disk, etc.), information on safety-related issues that need immediate action shall always be backed up with a hard copy that is readily available.		P

--- End of Report ---