TEST REPORT

EN ISO12100:2010 EN 60204-1:2006+A1:2009+AC:2010
Safety of machinery - General principles for design
- Risk assessment and risk reduction
Safety of machinery
- Electrical equipment of machines - Part 1: General requirements

Report

Report reference No. ..... :	QH-40006879
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Manufacturer

Name..... :	Laizhou Planet Machinery Co. Ltd
Address ..... :	Yutai Road South, Gangchenglu Street, Laizhou, Shandong
Testing location..... :	Yutai Road South, Gangchenglu Street, Laizhou, Shandong

Client

Name ..... :	Teknatool International Limited
Address.....:	7D Dallan Place,Rosedale,Auckland,0632,NZ

Test specification

Standard..... :	EN ISO12100:2010 EN 60204-1:2006+A1:2009+AC:2010
Test procedure ..... :	MD
Procedure deviation..... :	N.A.
Non-standard test method..... :	N.A.

Test report form/blank test report

Test report form No……:	QH-40006879
TRF modified by……:	Laizhou Planet Machinery Co. Ltd
Tested by(+ signature)……:	
Reviewed by(+ signature)……:	
Approved by(+ signature)…… :	

Test item	
Type of test object …….:	DVR Headstock
Trademark …….:	/
Model and/or type reference……:	DVR 1644(DVR Galaxi)
Manufacturer & Address……..……..:	Laizhou Planet Machinery Co. Ltd Yutai Road South, Gangchenglu Street, Laizhou, Shandong
Equipment mobility……..…….	Stationary
Operating condition ……:	Continuous
Tested for IT power systems :	No
IT testing, phase-phase voltage (V) :	N.A.
Protection against ingress of water…:	IP22
Testing	
Date of receipt of test item……...:	Apr. 5, 2016
Date(s) of performance of test…..:	Apr. 5, 2016
Possible test case verdicts	
Test case does not apply to the test object.....:	N(.A.)
Test object does meet the requirement.....:	P(ass)
Test object does not meet the requirement .....:	F(ail)
Test Verdict	PASS

General remarks

"(see remark #)" refers to a remark 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.

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 Manufacturer.

General descriptions

Remarks:

Ambient temperature: 24℃ humidity: 60%

Complete test was conducted on DVR 1644(DVR Galaxi)

DVR16XX、DVR18XX、DVR20XX、DVR22XX are family products.

Clause	Requirement-Test	Result-Remark	Verdict
1	Scope		P
	This international standard specifies basic terminology, principles and a methodology for achieving safety in the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective. These principles are based on knowledge and experience of the design, use, incidents, accidents and risks associated with machinery. Procedures are described for identifying hazards and estimating and evaluating risks during relevant phases of the machine life ycle, and for the elimination of hazards or the provision of sufficient risk reduction. Guidance is given on the documentation and verification of the risk assessment and risk reduction process.	The risk assessment report has been provided in this TCF to be carried out the hazards analysis	P
	It does not deal with risk and/or damage to domestic animals, property or the environment		P
2	Normative references The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies		P P
4			
	Strategy for risk assessment and risk reduction		P
	To implement risk assessment and risk reduction the designer shall take the following actions, in the order given		P
	a) determine the limits of the machinery, which include the intended use and any reasonably foreseeable misuse thereof;	Comply with the requirements	P
	b) identify the hazards and associated hazardous situations;	Comply with the requirements	P
	c) estimate the risk for each identified hazard and hazardous situation;	Comply with the requirements	P
	d) evaluate the risk and take decisions about the need for risk reduction;	Comply with the requirements	P
	e) eliminate the hazard or reduce the risk associated with the hazard by means of protective measures.	Comply with the requirements	P
	Risk assessment is a series of logical steps to enable, in a systematic way, the analysis and evaluation of the risks associated with machinery.		P
	The objective to be met is the greatest practicable risk reduction, taking into account the four below factors. The strategy defined in this clause is represented by the flowchart in Figure 1. The process itself is iterative and several successive applications can be necessary to reduce the risk, making the best use of available technology. In carrying out this process, it is necessary to take into account these four factors, in the following order of preference:		P
	- the safety of the machine during all the phases of its life cycle;	Al l the hazardous parts parts have been treated appropriately	P

Clause	Requirement-Test	Result-Remark	Verdict
	- the ability of the machine to perform its function;	The function have been stated in the instruction manual	P
	- the usability of the machine;	Pass muster	P
	- the manufacturing, operational and dismantling costs of the machine.		P
5	Risk assessment		P
5.1	General		P
	Risk assessment comprises		P
	- risk analysis, comprising 1) determination of the limits of the machinery (see 5.3),	Pass muster	P P
	2) hazard identification (5.4 and Annex B), and		P
	3) risk estimation (see 5.5), and		P
	- risk evaluation (see 5.6).		P
	Risk analysis provides information required for the risk evaluation, which in turn allows judgments to be made about whether or not risk reduction is required	The information is identified clearly and can be easily under understood	P
5.2	Information for risk assessment		P
	The information for risk assessment should include the following.		P
	a) Related to machinery description:		P
	1) user specifications;		P
	2) anticipated machinery specifications, including	All related information has been provided within the technical documentation	P
	i) a description of the various phases of the whole life cycle of the machinery,		P
	ii) design drawings or other means of establishing the nature of the machinery, and		P
	iii) required energy sources and how they are supplied;		P
	3) documentation on previous designs of similar machinery, if relevant;	All related information has been provided within the technical documentation	P
	4) information for use of the machinery, as available	All related information has been provided within the technical documentation	P
	b) Related to regulations, standards and other applicable documents:	Pass muster	P
	1) applicable regulations;		P
	2) relevant standards;		P
	3) relevant technical specifications;		P
	4) relevant safety data sheets.		P
	c) Related to experience of use:	Pass muster	P
	1) any accident, incident or malfunction history of the actual or similar machinery;		P

Clause	Requirement-Test	Result-Remark	Verdict
	2) the history of damage to health resulting, for example, from emissions (noise, vibration, dust, fumes, etc.), chemicals used or materials processed by the machinery;		P
	3) the experience of users of similar machines and, whenever practicable, an exchange of information with the potential users.		P
	d) Relevant ergonomic principles.	Pass muster	P
	The information shall be updated as the design develops or when modifications to the machine are required.		P
5.3	Determination of limits of machinery		P
5.3.1	General		P
	Risk assessment begins with the determination of the limits of the machinery, taking into account all the phases of the machinery life. This means that the characteristics and performances of the machine or a series of machines in an integrated process, and the related people, environment and products, should be identified in terms of the limits of machinery as given in 5.3.2 to 5.3.5.	The limits have been stated in the instruction manual See the rated clause	P
5.3.2	Use limits		P
	Use limits include the intended use and the reasonably foreseeable misuse. Aspects to be taken into account include the following:		P
	a) the different machine operating modes and different intervention procedures for the users, including interventions required by malfunctions of the machine;	Pass muster	P
	b) the use of the machinery (for example, industrial, non-industrial and domestic) by persons identified by sex, age, dominant hand usage, or limiting physical abilities (visual or hearing impairment, size, strength, etc.);	Pass muster	P
	c) the anticipated levels of training, experience or ability of users includin	Pass muster	P
	1) operators,		P
	2) maintenance personnel or technicians,		P
	3) trainees and apprentices, and		P
	4) the general public;		
	d) exposure of other persons to the hazards associated with the machinery where it can be reasonably foreseen:	Pass muster	P
	1) persons likely to have a good awareness of the specific hazards, such as operators of adjacent machinery;		P
	2) persons with little awareness of the specific hazards but likely to have a good awareness of site safety procedures, authorized routes, etc., such as administration staff;	Comply with the requirements	P
	3) persons likely to have very little awareness of the machine hazards or the site safety procedures, such as visitors or members of the general public, including children.		P

Clause	Requirement-Test	Result-Remark	Verdict
	If specific information is not available in relation to b), above, the manufacturer should take into account general information on the intended user population (for example, appropriate anthropometric data).		P
5.3.3	Space limits		P
	Aspects of space limits to be taken into account include	Pass muster	P
	a) the range of movement,		P
	b) space requirements for persons interacting with the machine, such as during operation and maintenance,		P
	c) human interaction such as the operator–machine interface, and		P
	d) the machine–power supply interface.		P
5.3.4	Time limits		P
	Aspects of time limits to be taken into account include	The time limits have been stated in the instruction manual	P
	a) the life limit of the machinery and/or of some of its components (tooling, parts that can wear, electromechanical components, etc.), taking into account its intended use and reasonably foreseeable misuse, and		P
	b) recommended service intervals.		P
5.3.5	Other limits		P
	Examples of other limits include	Pass muster	P
	a) properties of the material(s) to be processed,		P
	b) housekeeping — the level of cleanliness required, and		P
	c) environmental — the recommended minimum and maximum temperatures, whether the machine can be operated indoors or outdoors, in dry or wet weather, in direct sunlight, tolerance to dust and wet, etc.	Comply with the requirements	P
5.4	Hazard identification		P
	After determination of the limits of the machinery, the essential step in any risk assessment of the machinery is the systematic identification of reasonably foreseeable hazards (permanent hazards and those which can appear unexpectedly), hazardous situations and/or hazardous events during all phases of the machine life cycle, i.e.:		P
	- transport, assembly and installation; - commissioning; - use; - dismantling, disabling and scrapping.	Adequate information is stated in the accompanying documents	P
	Only when hazards have been identified can steps be taken to eliminate them or to reduce risks. To accomplish this hazard identification, it is necessary to identify the operations to be performed by the machinery and the tasks to be performed by persons who interact with it, taking into account the different parts, mechanisms or functions of the machine, the materials to be processed, if any, and the environment in which the machine can be used.	Comply with the requirements	P

Clause	Requirement-Test	Result-Remark	Verdict
	a) Human interaction during the whole life cycle of the machine Task identification should consider all tasks associated with every phase of the machine life cycle as given above. Task identification should also take into account, but not be limited to, the following task categories: - setting; - testing; - teaching/programming; - process/tool changeover; - start-up; - all modes of operation; - feeding the machine; - removal of product from machine; - stopping the machine; - stopping the machine in case of emergency; - recovery of operation from jam or blockage; - restart after unscheduled stop; - fault-finding/trouble-shooting (operator intervention); - cleaning and housekeeping; - preventive maintenance; - corrective maintenance.	Pass muster Comply with the requirements The function have been stated in the instruction manual	P
	b) Possible states of the machine These are as follows:	Pass muster	P
	1) the machine performs the intended function (the machine operates normally);		P
	2) the machine does not perform the intended function (i.e. it malfunctions) due to a variety of reasons, including	This requirement is considered	P
	- variation of a property or of a dimension of the processed material or of the workpiece,		P
	- failure of one or more of its component parts or services,		P
	- external disturbances (for example, shocks, vibration, electromagnetic interference)		P
	,- design error or deficiency (for example, software errors),	This requirement is considered	P
	- disturbance of its power supply, and		P
	- surrounding conditions (for example, damaged floor surfaces).		P
	c) Unintended behaviour of the operator or reasonably foreseeable misuse of the machine Examples include	Pass muster	P
	- loss of control of the machine by the operator (especially for hand-held or mobile machines),		P
	- reflex behaviour of a person in case of malfunction, incident or failure during the use of the machine,		P
	- behaviour resulting from lack of concentration or carelessness,		P
	- behaviour resulting from taking the “line of least resistance” in carrying out a task,		P
	- behaviour resulting from pressures to keep the machine running in all circumstances, and		P
	- behaviour of certain persons (for example, children, disabled persons).		P

Clause	Requirement-Test	Result-Remark	Verdict
5.5	Risk estimation		P
5.5.1	General		P
	After hazard identification, risk estimation shall be carried out for each hazardous situation by determining the elements of risk given in 5.5.2. When determining these elements, it is necessary to take into account the aspects given in 5.5.3.		P
	If standardized (or other suitable) measurement methods exist for an emission, they should be used, in conjunction with existing machinery or prototypes, to determine emission values and comparative emission data. This makes it possible for the designer to	Pass muster	P
	- estimate the risk associated with the emissions,		P
	- evaluate the effectiveness of the protective measures implemented at the design stage,		P
	- provide potential buyers with quantitative information on emissions in the technical documentation, and		P
	- provide users with quantitative information on emissions in the information for use.		P
5.5.2	Elements of risk		P
5.5.2.1	General		P
	The risk associated with a particular hazardous situation depends on the following elements:	Pass muster	P
	a) the severity of harm;		P
	b) the probability of occurrence of that harm, which is a function of		P
	1) the exposure of person(s) to the hazard,		P
	2) the occurrence of a hazardous event, and		P
	3) the technical and human possibilities to avoid or limit the harm.		P
5.5.2.2	Severity of harm		P
	theThefollowing:severity can be estimated by taking into account Pass muster		P
	a) the severity of injuries or damage to health, for example,		P
	- slight, - serious, - death.		P
	b) the extent of harm, for example, to - one person, - several persons.		P
5.5.2.3	Probability of occurrence of harm		P
5.5.2.3.1	Exposure of persons to the hazard		P
	The exposure of a person to the hazard influences the probability of the occurrence of harm. Factors to be taken into account when estimating the exposure are, among others,	PassAll themusterrelated information is stated in the instruction handbook	P
	a) the need for access to the hazard zone (for normal operation, correction of malfunction, maintenance or repair, etc.),		P

Clause	Requirement-Test	Result-Remark	Verdict
	b) the nature of access (for example, manual feeding of materials),		P
	c) the time spent in the hazard zone,		P
	d) the number of persons requiring access, and		P
	e) the frequency of access.		P
5.5.2.3.2	Occurrence of a hazardous event		P
	The occurrence of a hazardous event influences the probability of occurrence of harm. Factors to be taken into account when estimating the occurrence of a hazardous event are, among others,	Pass muster Manufacturer has provided enough safety devices to eliminate or reduce risks	P
	a) reliability and other statistical data,		P
	b) accident history,		P
	c) history of damage to health, and		P
	d) comparison of risks (see 5.6.3).		P
5.5.2.3.3	Possibility of avoiding or limiting harm		P
	The possibility of avoiding or limiting harm influences the probability of occurrence of harm. Factors to be taken into account when estimating the possibility of avoiding or limiting harm are, among others, the following:		P
	a) different persons who can be exposed to the hazard(s), for example, - skilled, - unskilled;	Pass muster These requirements have been complied with, and the related information also has been provide within the instruction manual	P
	b) how quickly the hazardous situation could lead to harm, for example, - suddenly, - quickly, - slowly;	These requirements have been complied with, and the related information also has been provide within the instruction manual	P
	c) any awareness of risk, for example, - by general information, in particular, information for use, - by direct observation, - through warning signs and indicating devices, in particular, on the machinery;	Enough warnings are provided in the appropriate spot	P
	d) the human ability to avoid or limit harm (for example, reflex, agility, possibility of escape);		P
	e) practical experience and knowledge, for example, - of the machinery, - of similar machinery, - no experience.	These requirements have been complied with, and the related information also has been provide within the instruction manual	P
5.5.3	Aspects to be considered during risk estimation		P
5.5.3.1	Persons exposed		P
	Risk estimation shall take into account all persons (operators and others) for whom exposure to the hazard is reasonably foreseeable.		P
5.5.3.2	Type, frequency and duration of exposure		P

Clause	Requirement-Test	Result-Remark	Verdict
	The estimation of the exposure to the hazard under consideration (including long-term damage to health) requires analysis of, and shall account for, all modes of operation of the machinery and methods of working. In particular, the analysis shall account for the needs for access during loading/unloading, setting, teaching, process changeover or correction, cleaning, fault-finding and maintenance.	Comply with the requirements	P
	The risk estimation shall also take into account tasks, for which it is necessary to suspend protective measures.	Comply with the requirements	P
5.5.3.3	Relationship between exposure and effects		P
	The relationship between an exposure to a hazard and its effects shall be taken into account for each hazardous situation considered. The effects of accumulated exposure and combinations of hazards shall also be considered. When considering these effects, risk estimation shall, as far as practicable, be based on appropriate recognized data.		P
5.5.3.4	Human factors		P
	Human factors can affect risk and shall be taken into account in the risk estimation, including, for example,	These requirements have been taken into account during the design of this machine	P
	a) the interaction of person(s) with the machinery, including correction of malfunction,	Pass muster	P
	b) interaction between persons,		P
	c) stress-related aspects,		P
	d) ergonomic aspects,		P
	e) the capacity of persons to be aware of risks in a given situation depending on their training, experience and ability,		P
	f) fatigue aspects, and		P
	g) aspects of limited abilities (due to disability, age, etc.).		P
5.5.3.5	Suitability of protective measures		P
	Risk estimation shall take into account the suitability of protective measures and shall	PassThis requirementmuster has been complied with	P
	a) identify the circumstances which can result in harm,		P
	b) whenever appropriate, be carried out using quantitative methods to compare alternative protective measures (see ISO/TR 14121-2), and		P
	c) provide information that can assist with the selection of appropriate protective measures.		P
5.5.3.6	Possibility of defeating or circumventing protective measures		P
	For the continued safe operation of a machine, it is important that the protective measures allow its easy use and do not hinder its intended use. Otherwise, there is a possibility that protective measures might be bypassed in order for maximum utility of the machine to be achieved.		P

Clause	Requirement-Test	Result-Remark	Verdict
	Risk estimation shall take account of the possibility of defeating or circumventing protective measures. It shall also take account of the incentive to defeat or circumvent protective measures when, for example,	Pass muster	P
	a) the protective measure slows down production or interferes with another activity or preference of the user,		P
	b) the protective measure is difficult to use,		P
	c) persons other than the operator are involved, or		P
	d) the protective measure is not recognized by the user or not accepted as being suitable for its function.		P
5.5.3.7	Ability to maintain protective measures		P
5.5.3.8	Risk estimation shall consider whether the protective measures can be maintained in the condition necessary to provide the required level of protection.		P
	Information for use		P
	Risk estimation shall take into account the information for use, as available. See also 6.4.		P
5.6	Risk evaluation		P
5.6.1	General		P
	After risk estimation has been completed, risk evaluation shall be carried out to determine if risk reduction is required. If risk reduction is required, then appropriate protective measures shall be selected and applied (see Clause 6). As shown in Figure 1, the adequacy of the risk reduction shall be determined after applying each of the three steps of risk reduction described in Clause 6. As part of this iterative process, the designer shall also check whether additional hazards are introduced or other risks increased when new protective measures are applied. If additional hazards do occur, they shall be added to the list of identified hazards and appropriate protective measures will be required to address them.	Pass muster Comply with the requirements	P
	Achieving the objectives of risk reduction and a favourable outcome of risk comparison applied when practicable gives confidence that risk has been adequately reduced.		P
5.6.2	Adequate risk reduction		P
	Application of the three-step method described in 6.1 is essential in achieving adequate risk reduction.		P
	Following the application of the three-step method, adequate risk reduction is achieved when	Pass muster	P
	- all operating conditions and all intervention procedures have been considered,		P
	- the hazards have been eliminated or risks reduced to the lowest practicable level,	Pass muster	P
	- any new hazards introduced by the protective measures have been properly addressed,		P
	- users are sufficiently informed and warned about the residual risks (see 6.1, step 3),		P

Clause	Requirement-Test	Result-Remark	Verdict
	- protective measures are compatible with one another,		P
	- sufficient consideration has been given to the consequences that can arise from the use in a nonprofessional/ non-industrial context of a machine designed for professional/industrial use, and	Comply with the requirements	P
	- the protective measures do not adversely affect the operator's working conditions or the usability of the machine.	Comply with the requirements	P
5.6.3	Comparison of risks		P
	As part of the process of risk evaluation, the risks associated with the machinery or parts of machinery can be compared with those of similar machinery or parts of machinery, provided the following criteria apply:	Pass muster	P
	- the similar machinery is in accordance with the relevant type-C standard(s); - the intended use, reasonably foreseeable misuse and the way both machines are designed and constructed are comparable;		P P
	- the hazards and the elements of risk are comparable;		P
	- the technical specifications are comparable;		P
	- the conditions for use are comparable.		P

6	Risk reduction		P
6.1	General		P
	The objective of risk reduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk:		P
	- severity of harm from the hazard under consideration;		P
	- probability of occurrence of that harm.		P
6.2	Inherently safe design measures		P
6.2.1	General		P
	Inherently safe design measures are the first and most important step in the risk reduction process. 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.	Pass muster	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.	These requirements have been taken into account during the design of this machine	P
6.2.2	Consideration of geometrical factors and physical aspects		P
6.2.2.1	Geometrical factors		P
	Such factors include the following.		P

Clause	Requirement-Test	Result-Remark	Verdict
	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:		P
	- the travelling and working area of mobile machines;		
	- the zone of movement of lifted loads or of the carrier of machinery for lifting persons;		
	- the area of contact of the tool of a hand-held or hand-guided machine with the material being worked.		
	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		
	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		P
	Such aspects include the following:		P
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;		P
	b) limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;		P
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing		N
	1) noise emission at source (see ISO/TR 11688-1),	Comply with the requirements	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

Clause	Requirement-Test	Result-Remark	Verdict
	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	Not applicable	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)].	Not applicable	P
6.2.3	Taking into account general technical knowledge of machine design		P
	This general technical knowledge can be derived from technical specifications for design (standards, design codes, calculation rules, etc.), which should be used to cover		P
	a) mechanical stresses such as		P
	- stress limitation by implementation of correct calculation, construction and fastening methods as regards, for example, bolted assemblies and welded assemblies,	Pass muster Comply with the requirements	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 - resistance to corrosion, ageing, abrasion and wear, - hardness, ductility, brittleness, - homogeneity, - toxicity, and - flammability, and	Pass muster	P
	c) emission values for - noise, - vibration, - hazardous substances, and - radiation.	Not applicable	N
6.2.4	Choice of appropriate technology		N
	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) on machines intended for use in explosive atmospheres, using		N
	- appropriately selected pneumatic or hydraulic control system and machine actuators,		
	- intrinsically safe electrical equipment (see IEC 60079-11);		
	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

Clause	Requirement-Test	Result-Remark	Verdict
	c) the use of alternative equipment to avoid high noise levels, such as - electrical instead of pneumatic equipment, - in certain conditions, water-cutting instead of mechanical equipment.		N
6.2.5	Applying principle of positive mechanical action		P
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements. An example of this is positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119).	The principle of the positive mechanical action of a component on another component has been appllied	P
6.2.6	Provisions for stability		P
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use. Factors to be taken into account include	These machines have been designed to have sufficient stability to allow them to be used safely in their specified conditions of use	P
	- the geometry of the base, - the weight distribution, including loading, - 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, - vibration, - oscillations of the centre of gravity, - characteristics of the supporting surface in case of travelling or installation on different sites (ground conditions, slope, etc.), and - external forces, such as wind pressure and manual forces.	The factor has been taken into account during design	P
6.2.7	Provisions for maintainability		P
	When designing a machine, the following maintainability factors shall be taken into account to enable maintenance of the machine: - accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used; - ease of handling, taking into account human capabilities; - limitation of the number of special tools and equipment.		P
6.2.8	Observing ergonomic principles		P
	Ergonomic principles shall be taken into account in designing machinery so as to reduce the mental or physical stress of, and strain on, the operator. These principles shall be considered when allocating functions to operator and machine (degree of automation) in the basic design.	Appropriate ergonomic principles have been taken into account in designing machinery to reduce mental or physical stress and strain of the operator	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).	Stressful postures and movements during the use of the machine have been avoided	P

Clause	Requirement-Test	Result-Remark	Verdict
	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.	This machine has been adjusted to the human strength and convenient movement	P
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatures.	This machine has been designed with low noise, vibration	P
	d) Avoid linking the operator's working rhythm to an automatic succession of cycles.	This situation has been avoided	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 - they are clearly visible and identifiable, and appropriately marked where necessary (see 6.4.4), - 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), - their location (for push-buttons) and their movement (for levers and hand wheels) are consistent with their effect (see IEC 61310-3), and - their operation cannot cause additional risk.	All design and arrangement of the control logic have been checked in compliance with this requirement	P
	g) Select, design and locate indicators, dials and visual display units so that - they fit within the parameters and characteristics of human perception, - 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 - the operator is able to perceive them from the control position.	All the information displayed complies with this requirement	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 EN requirements related to specific machines, see corresponding IEC standards (for example, IEC 61029, IEC 60745 or IEC 60335).	Please60204-1alsotestmakereportreference to	P
6.2.10	Pneumatic and hydraulic hazards		P
	Pneumatic and hydraulic equipment of machinery shall be designed so that	Pass muster	P
	- the maximum rated pressure cannot be exceeded in the circuits (using, for example, pressure-limiting devices),		P

Clause	Requirement-Test	Result-Remark	Verdict
	- no hazard results from pressure fluctuations or increases, or from loss of pressure or vacuum, - no hazardous fluid jet or sudden hazardous movement of the hose (whiplash) results from leakage or component failures,		P P
	- 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,		P
	- all elements of the equipment, especially pipes and hoses, are protected against harmful external effects,		P
	- 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		P
	- 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.		P
6.2.11	Applying inherently safe design measures to control systems		P
6.2.11.1	General		P
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061).	Inherently safe design measures to control system have applied	P
	The correct design of machine control systems can avoid unforeseen and potentially hazardous machine behaviour.		P
	Typical causes of hazardous machine behaviour are - an unsuitable design or modification (accidental or deliberate) of the control system logic, - a temporary or permanent defect or failure of one or several components of the control system, - a variation or a failure in the power supply of the control system, and - inappropriate selection, design and location of the control devices. Typical examples of hazardous machine behaviour are	These requirements have been complied with, and the related within the instruction manual information also has been provide	P
	Typical examples of hazardous machine behaviour are - unexpected start-up (see ISO 14118), - uncontrolled speed change, - failure to stop moving parts, - dropping or ejection of part of the machine or of a workpiece clamped by the machine, and - machine action resulting from inhibition (defeating or failure) of protective devices.	Pass muster Comply with the requirements	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:		N

Clause	Requirement-Test	Result-Remark	Verdict
	- systematic analysis of start and stop conditions; - 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); - clear display of the faults; - 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); - maintained stop commands (for example, interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000, Figure 1).	These requirements have been complied with, and the related information also has been provide within the instruction manual	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.	Pass muster	N N
6.2.11.2	Starting of an internal power source/switching on an external power supply		
6.2.11.3	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.		N
	Starting/stopping of a mechanism		P
	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).	This requirement has been taken into account during design	P
	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
6.2.11.4	Restart after power interruption		P
6.2.11.5	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).	The spontaneous restart of a machine when it is re-energized after power interruption has been prevented by contactor	P
	Interruption of power supply		P
	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:	The hazardous situations resulting from interruption or excessive fluctuation of the power supply has been prevented	P

Clause	Requirement-Test	Result-Remark	Verdict
	- the stopping function of the machinery shall remain; - 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); - 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		P
	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.		P
	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).		P
6.2.11.7	Safety functions implemented by programmable electronic control systems		N
6.2.11.7.1	General		N
	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
6.2.11.7.2	Hardware aspects		N
	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

Clause	Requirement-Test	Result-Remark	Verdict
	- architectural constraints (the configuration of the system, its ability to tolerate faults, its behaviour on detection of a fault, etc.), - selection, and/or design, of equipment and devices with an appropriate probability of dangerous random hardware failure, and - the incorporation of measures and techniques within the hardware so as to avoid systematic failures and control systematic faults.		P
6.2.11.7.3	Software aspects		N
	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
	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
	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
6.2.11.8	Principles relating to manual control		P
	These are as follows.		P
	a) Manual control devices shall be designed and located according to the relevant ergonomic principles given in 6.2.8, item f).	Manual control devices have been designed and located according to the relevant ergonomic principles given in 4.8.7	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.		N
	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.	Manual controls have been located out of reach of the danger zones	P
	d) Whenever possible, control devices and control positions shall be located so that the operator is able to observe the working area or hazard zone.		P
	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.		P
	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.		P

Clause	Requirement-Test	Result-Remark	Verdict
	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
	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).		N
	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).	This requirement is complied with	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
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		N
	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		N
	a) disables all other control modes,		P
	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,		P
	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		P
	d) prevents any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.		P
	This control mode shall be associated with one or more of the following measures: - restriction of access to the danger zone as far as possible;		N
	- emergency stop control within immediate reach of the operator;		P
	- portable control unit (teach pendant) and/or local controls (allowing sight of the controlled elements). See IEC 60204-1.		P
6.2.11.10	Selection of control and operating modes		N

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
	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
6.2.11.11	Applying measures to achieve electromagnetic compatibility (EMC)		N
	For guidance on electromagnetic compatibility, see IEC 60204-1 and IEC 61000-6.		N
6.2.11.12	Provision of diagnostic systems to aid fault-finding		N
	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
6.2.12	Minimizing probability of failure of safety functions		P
6.2.12.1	General		P
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine.		P
	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		P
	“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).	Reliable components have been used	P
6.2.12.3	Use of “oriented failure mode” components		N
	Oriented failure mode” components or systems are those in which the predominant failure mode is known in advance and which can be used so that the effect of such a failure on the machine function can be predicted.		N
	The use of such components should always be considered, particularly in cases where redundancy (see 6.2.12.4) is not employed.		N
6.2.12.4	Duplication (or redundancy) of components or subsystems		N

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.		N
	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
	Diversity of design and/or technology can be used to avoid common cause failures (for example, from electromagnetic disturbance) or common mode failures.		N
6.2.13	Limiting exposure to hazards through reliability of equipment		P
	Increased reliability of all component parts of machinery reduces the frequency of incidents requiring intervention, thereby reducing exposure to hazards.	This requirement is complied with	P
	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.		P
	Safety-related components (for example, certain sensors) of known reliability shall be used.		P
	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.		P
6.2.14	Limiting exposure to hazards through mechanization or automation of loading (feeding)/unloading (removal) operations		P
	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.	This requirement is complied with	P
	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.		P
6.2.15	Limiting exposure to hazards through location of setting and maintenance points outside danger zones		P
	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.		P
6.3	Safeguarding and complementary protective measures		P
6.3.1	General		P

Clause	Requirement-Test	Result-Remark	Verdict
	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.	Appropriate guards and protective devices have been used to protect persons whenever inherently safe design does not reasonably make it possible either to remove hazards or to sufficiently reduce risks	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		P
6.3.2.1	General		P
	This subclause gives guidelines for the selection and the implementation of guards and protective devices the primary purpose of which is to protect persons against hazards generated by moving parts, according to the nature of those parts (see Figure 4) and to the need for access to the danger zone(s).		P
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine.		P
	Consideration shall be given to the enclosure of control positions or intervention zones to provide combined protection against several hazards including a) hazards from falling or ejected objects, using, for example, protection in the form of a falling object protection structure (FOPS), b) emission hazards (protection against noise, vibration, radiation, substances hazardous to health, etc.), c) hazards due to the environment (protection against heat, cold, foul weather, etc.), d) hazards due to tipping over or rolling over of machinery, using, for example, protection in the form of roll-over or tip-over protection structures (ROPS and TOPS).		P
	The design of enclosed work stations, such as cabs and cabins, shall take into account ergonomic principles concerning visibility, lighting, atmospheric conditions, access, posture.		P
6.3.2.2	Where access to the hazard zone is not required during normal operation		P
	Where access to the hazard zone is not required during normal operation of the machinery, safeguards should be selected from the following: a) fixed guards (see also ISO 14120); b) interlocking guards with or without guard locking (see also 6.3.3.2.3, ISO 14119 and ISO 14120); c) self-closing guards (see ISO 14120:2002, 3.3.2); d) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496) or pressure-sensitive protective devices (see ISO 13856).	Fixed guards are provided	P
6.3.2.3	Where access to the hazard zone is required during normal operation		N

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) interlocking guards with or without guard locking (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this document);		P
	b) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496);		P
	c) adjustable guards;		P
	d) self-closing guards (see ISO 14120:2002, 3.3.2);		P
	e) two-hand control devices (see ISO 13851);		P
	f) interlocking guards with a start function (control guard) (see 6.3.3.2.5).		P
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault-finding, cleaning or maintenance		N
	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
6.3.2.5	Selection and implementation of sensitive protective equipment		N
6.3.2.5.1	Selection		N
	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
	Types of sensitive protective equipment include		N
	- light curtains, - scanning devices, for example, laser scanners, - pressure-sensitive mats, and - trip bars, trip wires.		P
	Sensitive protective equipment can be used		N
	- for tripping purposes, - for presence sensing, - for both tripping and presence sensing, or - to re-initiate machine operation — a practice subject to stringent conditions.		P
	The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:		N

Clause	Requirement-Test	Result-Remark	Verdict
	- tendency for the machinery to eject materials or component parts; - necessity to guard against emissions (noise, radiation, dust, etc.); - erratic or excessive machine stopping time; - inability of a machine to stop part-way through a cycle.		P
6.3.2.5.2	Implementation		N
	Consideration should be given to		N
	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),		P
	b) the reaction of the device to fault conditions (see IEC 61496 for electrosensitive protective equipment),		P
	c) the possibility of circumvention, and		P
	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).		P
	Sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that		N
	- a command is given as soon as a person or part of a person is detected,		P
	- 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,		P
	- 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,		P
	- the machine cannot operate during interruption of the detection function of the sensitive protective equipment, except during muting phases, and		P
	- 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.		P
6.3.2.5.3	Additional requirements for sensitive protective equipment when used for cycle initiation		N

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
	Cycle initiation by sensitive protective equipment shall be subject to the following conditions:		N
	a) only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used;		N
	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
	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
	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;		N
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPDs is capable of cycle re-initiation;		N
	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
6.3.2.6	Protective measures for stability		P
	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 - anchorage bolts, - locking devices, - movement limiters or mechanical stops, - acceleration or deceleration limiters, - load limiters, and - alarms warning of the approach to stability or tipping limits.		P
6.3.2.7	Other protective devices		N
	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 - when the operator has insufficient visibility of the hazard zone,		N

Clause	Requirement-Test	Result-Remark	Verdict
	- when the operator lacks knowledge of the actual value of a safety-related parameter (distance, speed, mass, angle, etc.), and		N
	- when hazards can result from operations other than those controlled by the operator.		N
	The necessary devices include		N
	a) devices for limiting parameters of movement (distance, angle, velocity, acceleration),		N
	b) overloading and moment limiting devices,		N
	c) devices to prevent collisions or interference with other machines,		N
	d) devices for preventing hazards to pedestrian operators of mobile machinery or other pedestrians,		N
	e) torque limiting devices, and breakage points to prevent excessive stress of components and assemblies,		N
	f) devices for limiting pressure or temperature,		N
	g) devices for monitoring emissions,		N
	h) devices to prevent operation in the absence of the operator at the control position,		N
	i) devices to prevent lifting operations unless stabilizers are in place,		N
	j) devices to limit inclination of the machine on a slope, and		N
	k) devices to ensure that components are in a safe position before travelling.		N
	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
6.3.3	Requirements for design of guards and protective devices		P
6.3.3.1	General requirements		P
	Guards and protective devices shall be designed to be suitable for the intended use, taking into account mechanical and other hazards involved. Guards and protective devices shall be compatible with the working environment of the machine and designed so that they cannot be easily defeated. They shall provide the minimum possible interference with activities during operation and other phases of machine life, in order to reduce any incentive to defeat them.	Guards and protective devices have been appropriately designed	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

Clause	Requirement-Test	Result-Remark	Verdict
	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
6.3.3.2	Requirements for guards		P
6.3.3.2.1	Functions of guards		N
	The functions that guards can achieve are		N
	- 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.		P
6.3.3.2.2	Requirements for fixed guards		P
	Fixed guards shall be securely held in place either		P
	- permanently (for example by welding), or		P
6.3.3.2.3	- 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
	Requirements for movable guards		P
	Movable guards which provide protection against hazards generated by moving transmission parts shall		P
	a) as far as possible when open remain fixed to the machinery or other structure (generally by means of hinges or guides), and		P
	b) be interlocking (with guard locking when necessary) (see ISO 14119).		P
	Movable guards against hazards generated by non-transmission moving parts shall be designed and associated with the machine control system so that		P
	- 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,		P
	- they can be adjusted only by an intentional action, such as the use of a tool or a key, and - 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).		P
6.3.3.2.4	Requirements for adjustable guards		N
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed. Manually adjustable guards shall be		N
	- designed so that the adjustment remains fixed during a given operation, and		N

Clause	Requirement-Test	Result-Remark	Verdict
	- readily adjustable without the use of tools.		
6.3.3.2.5	Requirements for interlocking guards with a start function (control guards)		N
	An interlocking guard with a start function may only be used provided that		N
	a) all requirements for interlocking guards are satisfied (see ISO 14119),		N
	b) the cycle time of the machine is short,		N
	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
	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
	e) all other guards, whether fixed (removable type) or movable, are interlocking guards,		N
	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
	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
6.3.3.2.6	Hazards from guards		P
	Care shall be taken to prevent hazards which could be generated by	No such hazards exist in this machine	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).		P
6.3.3.3	Technical characteristics of protective devices		P
	Protective devices shall be selected or designed and connected to the control system such that correct implementation of their safety function(s) is ensured.	This requirement has been taken into account during design	P
	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.		P
6.3.3.4	Provisions for alternative types of safeguards		N
6.3.4	Safeguarding to reduce emissions		N
6.3.4.1	General		N
	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).		N
6.3.4.2	Noise		N

Clause	Requirement-Test	Result-Remark	Verdict
	Additional protective measures against noise include - enclosures (see ISO 15667), - screens fitted to the machine, and - silencers (see ISO 14163).		N
6.3.4.3	Vibration		N
6.3.4.3	Additional protective measures against noise include - enclosures (see ISO 15667), - screens fitted to the machine, and - silencers (see ISO 14163).		N
	Vibration		N
	Additional protective measures against vibration include - vibration isolators, such as damping devices placed between the source and the exposed person, - resilient mounting, and - suspended seats.		N
	For measures for vibration isolation of stationary industrial machinery see EN 1299.		N
6.3.4.4	Hazardous substances		N
	Additional protective measures against hazardous substances include - encapsulation of the machine (enclosure with negative pressure), - local exhaust ventilation with filtration, - wetting with liquids, and - special ventilation in the area of the machine (air curtains, cabins for operators).		N
6.3.4.5	Radiation		N
	Additional protective measures against radiation include - use of filtering and absorption, and - use of attenuating screens or guards.		N
6.3.5	Complementary protective measures		P
6.3.5.1	General		P
	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices), nor information for use, could have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine. 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		P
	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:		P
	- the actuators shall be clearly identifiable, clearly visible and readily accessible;		P

Clause	Requirement-Test	Result-Remark	Verdict
	- 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; - the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.		P P
	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
6.3.5.3	Measures for the escape and rescue of trapped persons		N
	Measures for the escape and rescue of trapped persons may consist, among others, of		N
	- escape routes and shelters in installations generating operator-trapping hazards,		N
	- arrangements for moving some elements by hand, after an emergency stop,		N
	- arrangements for reversing the movement of some elements,		N
	- anchorage points for descender devices,		N
	- means of communication to enable trapped operators to call for help.		N
6.3.5.4	Measures for isolation and energy dissipation		N
	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:		N
	a) isolating (disconnecting, separating) the machine (or defined parts of the machine) from all power supplies;		N
	b) locking (or otherwise securing) all the isolating units in the isolating position;		N
	c) dissipating or, if this is not possible or practicable, restraining (containing) any stored energy which can give rise to a hazard;		N
	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
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts		P
	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.	Appropriate attachments are provided	P
	These attachments may be, among others,	Such devices are used	P
	- standardized lifting appliances with slings, hooks, eyebolts, or tapped holes for appliance fixing,		P

Clause	Requirement-Test	Result-Remark	Verdict
	- appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground,		P
	- fork locating devices for machines to be transported by a lift truck,		P
	- lifting and stowing gear and appliances integrated into the machine.		P
6.3.5.6	Measures for safe access to machinery		N
	Machinery shall be so designed as to enable operation and all routine tasks relating to setting and/or maintenance to be carried out as far as possible by a person remaining at ground level.		N
	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
	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
	In large automated installations, particular attention shall be given to safe means of access, such as walkways, conveyor bridges or crossover points.		N
6.4	Information for use		P
6.4.1	General requirements		P
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.	All the information is stated in the appropriate place	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, - the need for training, - the need for personal protective equipment, and - the possible need for additional guards or protective devices (see Figure 2, Footnote d).	All the information is stated in the appropriate place	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

Clause	Requirement-Test	Result-Remark	Verdict
6.4.1.3	Information for use shall cover, separately or in combination, transport, assembly and installation, commissioning, use of the machine (setting, teaching/programming or process changeover, operation, cleaning, fault-finding and maintenance) and, if necessary, dismantling, disabling and scrapping.		P
6.4.2	Location and nature of information for use		P
	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	All the information is stated in the appropriate place	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
	d) by other means such as signals and warnings outside the machine.		P
6.4.3	Signals and warning devices		N
	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
	It is essential that these signals		N
	a) be emitted before the occurrence of the hazardous event,		N
	b) be unambiguous,		N
	c) be clearly perceived and differentiated from all other signals used, and		N
	d) be clearly recognized by the operator and other persons.		N
	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
6.4.4	Markings, signs (pictograms) and written warnings		P
	Machinery shall bear all markings which are necessary		P
	a) for its unambiguous identification, including at least 1) the name and address of the manufacturer, 2) the designation of series or type, and 3) the serial number, if any,	Adequate information is provided	P
	b) in order to indicate its compliance with mandatory requirements, comprising 1) marking, and 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),		P

Clause	Requirement-Test	Result-Remark	Verdict
	c) for its safe use, for example, 1) maximum speed of rotating parts, 2) maximum diameter of tools, 3) mass (in kilograms) of the machine itself and/or of removable parts, 4) maximum working load, 5) necessity of wearing personal protective equipment, 6) guard adjustment data, and 7) frequency of inspection.		P
	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.		
	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.		P
6.4.5	Accompanying documents (in particular — instruction handbook)		P
6.4.5.1	Contents		P
	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 1) storage conditions for the machine, 2) dimensions, mass value(s), position of the centre(s) of gravity, and 3) indications for handling (for example, drawings indicating application points for lifting equipment);	All the related information is stated in the instruction handbook	P
	b) information relating to installation and commissioning of the machine, such as 1) fixing/anchoring and dampening of noise and vibration requirements, 2) assembly and mounting conditions, 3) space needed for use and maintenance, 4) permissible environmental conditions (for example, temperature, moisture, vibration, electromagnetic radiation), 5) instructions for connecting the machine to power supply (particularly on protection against electrical overloading), 6) advice on waste removal/disposal, and 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;	All the related information is stated in the instruction handbook	P

Clause	Requirement-Test	Result-Remark	Verdict
	c) information relating to the machine itself, such as 1) detailed description of the machine, its fittings, guards and/or protective devices, 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, 3) diagrams (especially schematic representation of safety functions), 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, 5) technical documentation of electrical equipment (see IEC 60204), and 6) documents attesting that the machine complies with mandatory requirements;	All the related information is stated in the instruction handbook	P
	d) information relating to the use of the machine, such as that related to or describing 1) intended use, 2) manual controls (actuators), 3) setting and adjustment, 4) modes and means for stopping (especially emergency stop), 5) risks which could not be eliminated by the protective measures implemented by the designer, 6) particular risks which can be generated by certain applications, by the use of certain fittings, and about specific safeguards necessary for such applications, 7) reasonably foreseeable misuse and prohibited applications, 8) fault identification and location, for repair and for restarting after an intervention, and 9) personal protective equipment needed to be used and the training that is required;	All the related information is stated in the instruction handbook	P
	e) information for maintenance, such as 1) the nature and frequency of inspections for safety functions, 2) specification of the spare parts to be used when these can affect the health and safety of operators, 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), 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 5) drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks);	All the related information is stated in the instruction handbook	P
	f) information relating to dismantling, disabling and scrapping;	All the related information is stated in the instruction handbook	P

Clause	Requirement-Test	Result-Remark	Verdict
	g) information for emergency situations, such as 1) the operating method to be followed in the event of accident or breakdown, 2) the type of fire-fighting equipment to be used, and 3) a warning of possible emission or leakage of hazardous substance(s) and, if possible, an indication of means for fighting their effects;	statedAll the inrelatedthe instructioninformationhandbookis	P
	h) maintenance instructions provided for skilled persons and maintenance instructions provided for unskilled persons, that need to appear clearly separated from each other.	All the related information is stated in the instruction handbook	P
6.4.5.2	Production of instruction handbook		P
	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
	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.		P
	d) Consideration should be given to presenting information in tabular form where this will aid understanding. Tables should be adjacent to the relevant text.		P
	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		P
	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

Clause	Requirement-Test	Result-Remark	Verdict
	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
	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
7	Documentation of risk assessment and risk reduction		P
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation of		P
	a) the machinery for which the risk assessment has been made (for example, specifications, limits, intended use);		P
	b) any relevant assumptions that have been made (loads, strengths, safety factors, etc.);		P
	c) the hazards and hazardous situations identified and the hazardous events considered in the risk assessment;		P
	d) the information on which risk assessment was based (see 5.2): 1) the data used and the sources (accident histories, experience gained from risk reduction applied to similar machinery, etc.); 2) the uncertainty associated with the data used and its impact on the risk assessment;		P
	e) the risk reduction objectives to be achieved by protective measures;		P
	f) the protective measures implemented to eliminate identified hazards or to reduce risk;		P
	g) residual risks associated with the machinery;		P
	h) the result of the risk assessment (see Figure 1);		P
	i) any forms completed during the risk assessment.		P
	Standards or other specifications used to select protective measures referred to in f) above should be referenced.		P

EN 60204-1:2006+A1:2009+AC:2010			
1	Scope		P
	This part of EN 60204 applies to the application of electrical and electronic equipment and systems to machines not portable by hand while working. Including a group of machines working higher level system aspects		P
	This part is applicable to the electrical equipment or parts of the electrical equipment that operate with nominal supply voltages not exceeding 1000V for alternating current and not exceeding 1500V for direct current, and with nominal frequencies not exceeding 200Hz	The nominal supply voltage for the machine is AC220±5V, and the nominal frequency is 50Hz	P

4.	General requirements		P
4.1	The risks associated with the hazards relevant to the electrical equipment shall be assess as part of the overall requirements for risk assessment of the machine	See the risk assessment report in detail	P
4.2	Selection of equipment		P
4.3	Electrical components and devices shall be suitable for their intended use and shall conform to relevant IEC standards where such exist		P
	Electrical supply		P
4.4	The electrical equipment shall be designed to operate correctly with the relevant conditions of supply	They can be operated correctly with the relevant conditions of supply	P
	Physical environment and operating conditions		P
	Shall be suitable for use as specified:		P
	- electromagnetic compatibility	This machine is suitable for use as specified in this clause	P
	- ambient air temperature		
	- humidity		
	- altitude		
	- contaminants		
	- longizing and non-ionizing radiation		
	- vibration, shock and bump		
4.5	Transportation and storage		P
	-2.5℃ to + 55℃ and short periods not exceeding 24h at up to + 70℃		P
4.6	Provisions for handling		P
4.7	Heavy and bulky equipment shall be moved by cranes or similar equipment		P
	Instaliation and operation		P
	According to supplier’s instructions		P

5	Incoming supply conductors terminations and devices for disconnecting and switching off		P
5.1	Incoming supply conductor terminations		P
	Single or multiple power supply	Single power supply	P

	The supply conductors are terminated at the supply disconnection device if not, the separate terminals shall be provided	Terminated at the supply disconnection device	P
	If a neutral conductor is used, it shall be indicated clearly in the technical documentation	Not applicable Not neutral has been used	N
	Labelled N shall be provided for the neutral conductor	Neutral has been used	P
	No connection between the protective bonding circuit and the neutral conductor	See the electrical diagram	P
	All terminals for the incoming suply connection shall be identified clearly	All of them have been identified clearly	P
5.2	Terminal for connection to the external protective earthing system		P
	Shall be in the vicinity of the associated phase conductor terminals		P
	Cross-sectional area of the external protective copper conductor according to table 1		P
	Marking of the external protective conductor with the letters ”PE”		P
	Marking of earthing terminals	⏚	P
5.3	Supply disconnecting (isolating) device		P
5.3.1	A supply disconnecting device shall be provided:		P
	- for each incoming source of supply to a machine		P
	- for the source of supply to a feeder system using collector wires, collector bars, slip-ring assemblies, flexible cable systems, to a machine or a number of machines		P
	- for each on-board power supply		
	When two or more supply disconnecting devices are provided, protective interlocks for their correct operation shall be used where a hazardous condition or damage to the machine or to the work in progress can occur	Not applicable	N
5.3.2	The supply disconnecting device shall be one of the following types:		P
	a) a switch-disconnector, with or without fuses, in accordance with IEC 60947-3, utilization category AC-23B or dc-23B		N
	b) a switch-disconnector, with or without fuses, in accordance with IEC 60947-3, that has an auxiliary contact that in all cases causes switching devices to break the load circuit before the opening of the main contacts of the disconnector		N
	c)a circuit-breaker suitable for isolation in accordance with IEC 60947-2		P
	d)a plug/socket combination for a machine with a rated current not exceeding 16A and a total power rating not exceeding 3KW		N
	e) a plug/socket-outlet or an appliance coupler for a flexible cable supply to a mobile machine under the following condition:		N

	- it shall not be possible to connect or disconnect a ply and socket-outlet or an appliance couplet, without breaking capacity, during load conditions		N
	- the plug and socket-outlet or the appliance coupler shall be so connected that the part connected to the incoming supply is that which is protected to at least IP2X or IPXXB		N
	The electrical equipment shall have a device for switching the machine on and off		P
5.3.3	Requirements		P
	Have one OFF and one ON position only		P
	Marked clearly with ”I” and ”O”		P
	Have a reset (tripped) position between ”O” and ”I”		P
	Have an external operating handle		N
	The handle should be Black or Grey		N
	Could be locked in the OFF position		P
	Disconnect all live conductors of its power supply circuit		P
	Sufficient breaking capacity		P
5.3.4	Operating handle		N
	Shall be easily accessible and located:0.6m~0.9m	Not such handle	N
5.3.5	Excepted circuits		N
	Have their own disconnecting device (Reconnended)	Not applicable No excepted circuit has been found	N
	If no disconnecting device, the relevant safety requirements shall be complied with	Not applicable No excepted circuit has been found	N
5.4	Devices for switching off for prevention of unexpected start-up		P
	Unexpected start-up shall be prevented (Devices described in 5.3.2 may fulfil this function)	Pass muster	P
5.5	Devices shall be provided for disconnecting (isolating) electrical equipment to enable work to be carried out without a risk form electric shock or burn		P
5.6	Protection against unauthorized, inadvertent and/or mistaken connection		P
	The devices described in 5.4 and 5.5 shall be equipped with such function		P

6	Protection against electric shock		P
6.1	General	See the relevant clauses	P
6.2	Protection against direct contact		P
6.2.1	General	See the relevant clauses	P
	Either 6.2.2 or 6.2.3 and, where applicable, 6.2.4 shall be applied		P

	When the equipment is located in places open to all persons, measures of either 6.2.3 or 6.2.2 with a min, degree of protection against direct contact corresponding to IP4X or IPXXD shall be applied	Not applicable This machine shall be located in the factory, and be operated by the authorized persons	N
6.2.2	Protection by enclosures		P
	Min protection degree for live parts: IP2X or IPXXB	IP2X	P
	Min protection degree for top surface: IP4X or IPXXD	IP4X	P
	Opening an enclosure shall only be possible under one of the folowing conditions:		P
	a) the use of a key or tool is necessary bu skilled or instructed persons		P
	b) the disconnection of live parts inside the enclosure before the enclosure may be opened(Use of the supply disconnecting device)		P
	c) opening without the use of a key or a tool and without disconnection of live parts shall be possible only when the min.protection degree is IP2X or IPXXB	Not applicable No this kind of situation	N
6.2.3	Rotection by insulation of live parts		P
	Live parts shall be covered by insulation which can only be removed by destruction		P
6.2.4	Such insulation shall withstand the mechanical, chemical, electrical and thermal stresses under normal service conditions	Pass muster	P
	Protection against residual voltages		N
	After disconnecting, any exposed conductive part having a residual voltage that shall be discharged to 60V or less within 5 seconds	Not exposed conductive part	N
	If mentioned above is not possible, a warning notice drawing shall provided	Not applicable	N
	If the withdrawal of plugs or similar devices would make the exposure of the conductors, the discharge time shall not exceed I second such conductor shall have the protection degree at least IP2X or IPXXB	Not applicable No this kind of situation has been found	N
6.2.5	Protection by barriers	No barriers	N
6.2.6	For protection by barriers, see 412.4 or IEC60364-4-41		N
	Protection by placing out of reach or protection by obstacles		N
	For protection by placing out of reach see 412.4 of IEC60364-4-41		N
	For protection by obstacles see 412.4 of IEC60364-4-41		N
	For collector wire systems or collector bar systems with a degree of protection less than IP2X see 13.8.1		N
6.3	Protection against indirect contact		P
6.3.1	General		P
	For each circuit or part, at least one of the measures in accordance with 6.3.2 to 6.3.3 shall be applied	See the following descriptions	P

6.3.2	Measure to prevent the occurrence of a hazardous touch voltage		P
6.3.2.1	General		P
6.3.2.2	Protection by use of class II equipment or by equivalent insulation		P
	Application of class II equipment or equivalent insulation	Appropriate insulations have been provided	P
6.3.2.3	Protection by electrical separation		P
	Application of electrical separation		P
6.3.2.4	Supply system design		N
	Application of a supply system designed with its neutral point either insulated from or having a high impedance to earth	Not applicable	N
6.3.3	Protection by automatic disconnection of supply		N
	Use of the automatic disconnection of supply		N
6.4	Protection by the use of PELV	No PELV circuit has been used	N
6.4.1	General requirements		N
	PELV (protective extra-low voltage) circuits shall satisfy all of the conditions specified in this clause		N
6.4.2	Sources for PELV		N
	The sources for PELV shall be one of the conditions specified in this clause		N
	Protection of equipment		N

7	Protection of equipment		P
7.1	General: the measures to be taken to protect equipment against the effects of :		P
	- overcurrent arising from a short circuit		P
	- overload current		P
	- earth fault		P
	- overvoltage due to lightning and switching surges		N
	- abnormal temperature		N
	- loss of or reduction in the supply voltage		P
	- overspeed of machines/machine elements		P
	- incorrect phase sequence		P
7.2	Over current protection		P
7.2.1	General		P
7.2.2	Supply conductors		P
	The supplier is not responsible for providing the over current device for the supply conductors		P
	Installation diagram with data necessary for selection of the over current protective device	Pass muster	P
7.2.3	Power circuits		P
	All conductors shall be protected against over current (except earthed neutral conductor)		P
	Cross-section area of neutral conductor	No neutral conductor has been used	N

	For neutral conductors smaller than phase conductors then IEC 364-4-473 shall apply	No neutral conductor has been used	N
	In IT-systems, it is recommended that the neutral conductor is not used	Not applicable	N
7.2.4	Control circuits		P
	Conductors of control circuits connected to the supply voltage and of circuits feeding control circuit transformers shall be protected against over current in accordance with 7.2.3	Pass muster	P
7.2.5	Socket outlets and their associated conductors		P
7.2.6	Over current protection devices shall be provided in the unearthed live conductors		P
	Lighting circuits		N
	All unearthed conductors of circuits supplying lighting shall be protected against the effects of short circuits by the procision of over current devices separate from those protecting other circuits		N
7.2.7	Transformers		P
	Transformers shall be protected aainst Over current in accordance with IEC60076-5 and IEC60743 as appropriate	All transformer have been protected against over current	P
	The type and setting of the overcurrent protective device should be in accordance with the recommendations of the transformer supplier		P
7.2.8	Location of over current protective device		P
7.2.9	Over current protective device shall be located at the point where the conductors to be protected are connected to their supply	Pass muster	P
	Over current protective devices		P
	Sufficient breaking capacity		P
	Where fuses are used, a type readily available in the country of use shall be selected, or arrangement shall be made with the use for the supply of spare parts	Pass muster	P
7.2.10	Rating and setting of over current protective devices		P
	The rated current of fuses or the setting current of other over current protective devices shall be selected as low as possible but adequate for the anticipated over currents		P
	The rated current or setting of an over current protective device is determined by the current carrying capacity of the conductors to b e protected by that device in accordance with 13.4		P
7.3	Over load protection of motors		P
	Overload protection of motors shall be provided for each motor rated at more than 0.5KW	The overload protection is provided	P
	In applications where an automatic interruption of the motor operation is unacceptable, the overload detection shall give a warning signal to which the operator can respond	Pass muster	P
	Detection of overload shall be provided in each live conductor excepted for the neutral conductor	This function has been provided	P

	For motors having single-phase or d.c. power supplies. Detection in only one unearthed live conductor is permitted	The detection are in each unearthed live conductors	N
	Automatic restarting of any motor after the operation of overload protection shall be prevented	No automatic restarting function has been used	P
7.4	Abnormal temperature protection		N
	Use of abnormal temperature protection	No used	N
7.5	Protection against supply interruption or voltage reduction and subsequent restoration		P
	Where a voltage drop or a supply interruption can cause a hazardous condition, damage to the machine, or to the work in progress, under voltage protection shall be provided		N
	The operation of the under voltage device shall not impair the operation of any stopping control of the machine		N
	Upon restoration of the voltage or upon swiching on the incoming supply, automatic or unexpected restarting of the machine shall be prevented	Automatic of unexpected restarting of the machine can be prevented	P
	Where only a part of the machine or of the group of machines working together in a coordinated manner is affected by the voltage reduction or supply interruption, the under voltage protection shall initiate appropriate control responses to ensure co-ordination+		N
7.6	Motor over speed protection		P
	Use of the motor over speed protection		P
7.7	Earth fault/residual current protection		P
	Use of earth fault/residual current protection for automatic disconnection		P
7.8	Phase sequence protection		P
7.9	Where an incorrect sequence of the supply voltage can cause a hazardous condition or damage to the machine protection shall be provided		P
	Protection against over voltage due to lighting and to switching surges		N
	Protection devices can be provided to protect against the effects of over voltages due to lighting or to switching surges		N
	Devices for the suppression of overvoltages due to lightning shall be connected to the incoming terminals of the supply disconnecting device		N
	Devices for the suppression of overvoltages due to switching surges shall be connected across the terminals of all equipment requiring such protection		N
8	Equipotential bonding		P
8.1	This clause provides requirements for both protective bonding and operational bonding		P
8.2	Protective bonding circuit		P
8.2.1	General		P

	On mobile machines with on-board power supplies, it shall be connected to a protective bonding terminal to provide protection against electric shock	Pass muster	P
	When a mobile machine is laso cppable of being connected to an external incoming supply, the protective bonding terminal shall be the connection point for the external protective conductor	Pass muster	P
	All parts of the protective bonding circuit shall be so designed that they are capable of with standing the highest thermal and mechanical stresses	This requirement has been complied with	P
	Any structural part of the electrical equipment or of the machine may be used as part of protective bonding circuit	They have been used as part of protective bonding circuit	P
	If an IT distribution system is used, the machine structure shall be sued as part of the protective bonding circuit in conjunction with an earth fault supervision system	Not applicable	N
	The structural bonding is not required where all the equipment provided is in accordance with 6.3.2.2		P
8.2.2	Protective conductors		P
	Protective conductiors shall be identified according to 14.2.2		P
	Copper conductors should be used		P
	Where a conductors material other than copper is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor and such conductors shall not be less than 16mm^2 in cross-sectional area	Pass muster	N
	The cross-sectional area of protective conductors shall be determined according to the requirements of : - 543 of IEC60364-5-54 or - 7.4.3.1.7 of IEC 60439-1, as appropriate	They have been used according to these requirements	P
8.2.3	Continuity of the protective bonding circuit		P
	All exposed conductive parts of the electrical equipment and machine shall be connected to the protective bonding circuit	connected to the protective bonding circuit	P
	Connection and bonding points shall be so designed that their current-carrying capacity is not impaired by mechanical ,chemical, or electrochenical influences	Copper	P
	Metal ducts of flexible or rigid construction and metallic cable sheaths shall not be used as protective conductors	No use metal ducts of flexible or rigid construction and metallic cable sheaths	P
	The continuity of the protective conductor in cables that are exposed to damage shall be ensured by appropriate measures	No such equipment	N
8.2.4	Exclusion of switching devices from the protective bonding circuit		P
8.2.5	The protective bonding circuit shall not incorporate a switch device, an overcurrent protective device nor a means for current detection for such devices		P
	Parts that need not be connected to the protective bonding circuit		P

	This applies to small parts such as screws, rivets, and nameplates and to parts inside an enclosure, irrespective of their size		P
8.2.6	Interruption of the protection bonding circuit		P
	Where the continuity of the protective bonding circuit can be interrupted by means of removable current collectors or plug/socket combinations, the protective bonding circuit shall not be interrupted before the live conductors have been disconnected, and shall be re-established before any live conductor is reconnected		P
	Metallic housings of plug/socket combinations shall be connected to the protective bonding circuit except where used for PELV	No such equipment	N
8.2.7	Protective conductor connecting points		P
	All protective conductors shall be terminated in accordance with 14.1.1		P
	Each protective conductor connecting point shall be identified as such using the symbol 60417-2-IEC-5019” ⏚”	⏚	P
	Terminals for connection of the protective conductor may be identified by the bicolour combination GREEN-AND-YELLOW	GREEN-AND-YELLOW	P
8.3	Bonding for operational purposes		P
8.3.1	The objective of operational bonding is to minimize:		P
	-the consequence of an insulation failure on the operation of the machine		P
	-the consequences of electrical disturbances on the operation of sensitive electrical equipment		P
8.3.2	Bonding to the protective circuit		P
8.3.3	One method for protection against unintended operation as a result of insulation failures is achieved by connecting one side of a control circuit fed by a transformer to the protective bonding circuit, with the control devices connected in accordance with 9.1.4	The measure described in this clause has been used	P
	Bonding to common reference potential		P
	The effects of disturbances can be reduced by employing a low resistance conductor in a low impedance network that is used as a reference level for high frequency signals within the electrical equipment	Pass muster	P

9	Control circuits and control functions		P
9.1	Control circuits		P
9.1.1	Control circuit supply		P
	Transformers shall be used for supplying the control circuits	The transformers have been used	P
	Transformers are not mandatory for machines with a single motor starter and a maximum of two control devices	Not applicable	N
9.1.2	Control circuit voltages		P

	The nominal voltage shall not exceed 277V when supplied from a transformer	The nominal voltage for control circuit is 220±5V	P
9.1.3	Protection		P
9.1.4	Over current protection shall be provided according to 7.2.4 and 7.2.10	The over current protection has been provided	P
	Connection of control devices		P
	Appropriate connection for control devices		P
9.2	Control functions		P
9.2.1	Start functions		P
	Start functions shall operate by energizing the relevant circuit		P
9.2.2	Stop functions		P
9.2.3	Each machine shall be equipped with appropriate stop functions		P
	Operating modes		P
	Each machine can have one or more operating modes determined by the type of machine and its application	Pass muster	P
	Safeguarding shall remain effective for all operating modes		P
	Indication of the selected operating mode shall be provided		P
9.2.4	Suspension of safeguarding		P
	Where it is necessary to suspend safeguarding, a mode selection device or means capable of being secured in the desired mode shall be provided so as to prevent automatic operation	Pass muster	P
9.2.5	Operation		P
9.2.5.1	The necessary interlocks shall be provided for safe operation		P
	Measures shall be taken to prevent movement of the machine in an unintended manner after any stopping of the machine	No unintended operation can be occurred after any stopping of the machine	P
9.2.5.2	Start		P
	The start of an operation shall be possible only when all of the safeguards are in place and are functional except for conditions as described in 9.2.4		P
	On those machines where safeguards cannot be applied for certain operations, manual control of such operations shall be by hold-to-run controls, together with enabling devices, as appropriate	Not applicable	N
	Suitable interlocks shall be provided to secure correct sequential starting		P
	One machines requiring the use of more than one control station to initiate a start:		P
	- each control station shall have a separate manually actuated start control device		P
	- all required conditions for machine operation shall be met		P

	- all start control devices shall be in the released position before a start may be permitted		P
	- all start control devices shall be actuated concurrently		P
9.2.5.3	Stop		P
	Stop functions shall override related start functions		P
	The STOP function required for sewing units and systems is met by a hold-to-run control device		P
9.2.5.4	Emergency operations		P
9.2.5.4.1	General		P
9.2.5.4.2	Emergency stop		P
	Shall function either as a category o stop or as a category 1 stop	Category 1 stop	P
	The choice of the emergency stop shall be determined by the risk assessment of the machine	According to the result of risk assessment of the machine	P
	Where a category 0 stop is used for emergency stop function, it shall have only hard-wired electromechanical components		P
	The operation of emergency stop shall not depend on electronic logic or on the transmission of commands over a communications network or link	No this kind of situation	P
	Where a category 1 stop is used for the emrgency stop function, final removal of power to the machine actuators shall be ensured and carried out by means of electromechanical components	The final removal of power to the machine actuators is ensured by the controller and carried out by means of electromechanical components	P
9.2.5.4.3	Emergency switching off		P
	The functional aspects of emergency switching off are given in IEC60364-4-46		P
	Emergency switching off is accomplished by disconnecting the incoming supply of the machine effecting a category 0 stop	1 stop	N
	When a machine cannot tolerate the category 0 stop, it may be necessary to provide other protection ,for example against direct contact, so that emergency switching off is not necessary	1 stop	P
9.2.5.5	Monitoring of command actions		P
	Movement or action of a machine or part of a machine that can result in a hazardous condition shall be monitored	They have been monitored by the controller during the working of the machine	P
9.2.5.6	Hold-to-run controls		P
	Hold-to-run controls shall require continuous actuation of the control device to achieve operation	Pass muster	P
9.2.5.7	Two-hand control		P
	Three types of two-hand control are available, the selection of which is determined by the assessment	Pass muster	P
9.2.5.8	Enabling device		P
	It shall be designed to allow motion when actuated in one position only (In any other position motion shall be stopped)	These machines have been designed to allow motion when actuated in one position only.	P
9.2.6	Combined start and stop controls		N

	Push-buttons and similar control devices that ,when operated, alternately initiate and stop motion shall only be used for functions which cannot result in a hazardous condition	Not applicable	N
9.2.7	Cableless control	No cableless control is used	N
9.2.7.1	General		N
	This subclause deals with the functional requirements of control systems employing cableless techniques for transmitting commands and signals between a machine control system and operator control station		N
	Means shall be provided to readily remove or disconnect the power supply of the operator control station		N
	Each operator control station shall carry an unambiguous to be controlled by that operator control station		N
9.2.7.2	Control limitation		N
	Measures shall be taken to ensure that control commands:		N
	- affect only the intended machine		N
	- affect only the intended functions		N
	Measures shall be taken to prevent the machine from responding to signals other than those from the intended operator control station		N
9.2.7.3	Stop		N
9.2.7.4	Operator control stations shall include a separate and clearly identifiable means to initiate the stop function of the machine or of all the motions that can cause a hazardous condition		N
	Serial data communication		N
	In a machine where the control of safety-related functions relies on serial data transfer, correct communications shall be ensured by using an error detection method that is able to cope with up to three error bits in any command sequence		N
9.2.7.5	Use of more than one operator control station		N
9.2.7.6	Where a machine has more than one operator control station, measures shall be taken to ensure that only one control station can be enabled at a given time		N
	Battery-powered operator control stations		N
	A variation in the battery voltage shall not cause a hazardous condition		N
9.3	Protective interlocks		P
9.3.1	Reclosing or resetting of an interlocking safeguard		P
	The reclosing or resetting of an interlocking safeguard shall not initiate machine motion or operation where that can result in a hazardous condition	No safeguard can initiate machine motion or operation	P
9.3.2	Overtravel limits		P

	Where an overtravel can cause a hazardous condition, a position sensor or limit switch shall be provided to initiate appropriate devices	Appropriate position sensors and limit switches have been used	P
9.3.3	Operation of auxiliary functions	Not applicable	N
9.3.4	The correct operation of auxiliary functions shall be checked by appropriate devices		N
	Interlocks between different operations and foe contrary motions		P
	All contactors, relays, and other control devices that control elements of the machine and that can cause a hazardous condition when actuated at the same time, shall be interlocked against incorrect operation	Pass muster	P
	Reversing contactors shall be interlocked in such a way that in normal service no short circuit can occur when switching		P
9.3.5	Reverse current braking		N
	Where reverse current braking is used on a motor, effective measures shall be taken to avoid the motor starting in the opposite direction at the end of braking where that reversal can cause a hazardous condition or damage to the machine or to the work in progress	Not applicable	N
9.4	Control functions in the event of failure		P
9.4.1	General requirements		P
	Provision of control functions in case of failure according to the level of risk assessment	According to the risk assessment	P
9.4.2	Measures to minimize risk in the event of failure		P
9.4.2.1	Use of proven circuit techniques and components	Appropriate components have been used	P
9.4.2.2	Provisions for redundancy		N
9.4.2.3	By providing partial or complete redundancy it is possible to minimize the probability that one single failure in the electrical circuit can result in a hazardous condition	Not applicable	N
	Use of diversity		N
9.4.2.4	The use of control circuits having different principles of operation or using different types of devise may reduce the probability of hazardous resulting from faults and/or failures	Not applicable	N
	Functional tests		P
	Carried out automatically by the control system or manually by inspection	By inspection manually	P
9.4.3	Protection against maloperation due to earth faults, voltage interruptions and loss of circuit continuity		P
9.4.3.1	Earth faults		P
	Earth faults on any control circuits shall not cause unintentional starting, potentially hazardous motions, or prevent stopping of the machine	Make reference to the relevant clauses	P
9.4.3.2	Voltage interruptions		P

	Where a memory device is used, proper functioning in the event of power failure shall be ensured to prevent any loss of memeory taht can result in a hazardous condition	Any loss of memory can't result in a hazardous condition	P
9.4.3.3	Loss of circuit continuity		N
	Where the loss of continuity of safety-related control circuits depending upon sliding contacts can result in a hazardous condition, appropriate measures shall be taken	Not applicable	N

10	Operator interface and machine-mounted control devices		P
10.1	General		P
10.1.1	General device requirements		P
	The clause contains requirements for devices mounted outside or partially outside control enclosures	These requirements appropriate for this machine have been complied with	P
10.1.2	Location and mounting		P
	As far as is practicable ,machine-mounted control devices shall be :		P
	- readily accessible for service and maintenance		P
	- mounted in such a manner as to minimize the possibility of damage from activities such as material handling		P
	The actuators of hand-operated control devices shall be selected and installed so that:		P
	- they are not less than 0,6m above the servicing level and are within easy reach of the normal working position of the operator		P
	- the operator is not placed in a hazardous situation when operating them		P
	- the possibility of inadvertent operation is minimized		P
10.1.3	Protection		P
10.1.4	Where mounted as intended, operator interface and machine mounted control devices shall withstand the stresses use	withstand the stresses use	P
	Position sensors		P
	Position sensors shall be so arranged that they will not be damaged in the event of overtravel	Because of the location of those position sensors, they can not be damaged in the event of over travel.	P
	Position sensors used in circuits with safety-related functions either shall have positive opening operation or shall provide similar reliability	Positive opening mode	P
10.1.5	Portable and pendant control stations		N
	Portable and pendant control stations and their control devices shall be so selected and arranged as to minimize the possibility of inadvertent machine operations caused by shocks and vibrations	Not applicable	N
10.2	Push-buttons		P
10.2.1	Colors		P

	Push-button actuators shall be color-coded according to table 2		P
	The colours for START/ON actuators should be WHITE,GREY or BLACK with a preference for WHITE. GREEN is also permitted. RED shall not be used	Pass muster	P
	The colour RED shall be used for emergency stop and emergency switching off actuators	Pass muster	P
	As far as is practicable, push-button actuators shall be colour-coded in accordance with table 2; limitations of the practicability are sizes of actuators and built-in casing, design of actuators		P
10.2.2	Markings		P-
10.2.3	Use of adequate markings for push-buttons	Adequate markings are used	P
10.3	Indicator lights and displays		P
10.3.1	Modes of use		P
	Indication and / or confirmation		P
10.3.2	Colors		P
	Unless otherwise agreed between the supplier and the user, indicator light lenses shall be colour-coded with respect to the condition of the machine in accordance with Table 3	Their colors are according to table 3	P
10.3.3	Flashing lights		P
	Use of flashing lights	A red-yellow-green flashing light is used	P
10.4	Illuminated push-buttons		N
	As far as is practicable, illuminated push-buttons shall be colour-coded in accordance with table 2 and table 3; limitations of the practicability are sizes of actuators and built-in casing, design of actuators	No such equipment	N
10.5	Rotary control devices	No such equipment	N
	Devices having a rotational member, such as potentiometers and selector switches, shall be mounted in such a way as to prevent rotation of the stationary member		N
10.6	Start devices		P
	Actuators used to initiate a start function or the movement of machine elements shall be constructed and mounted so as to minimize inadvertent operation	Flat type start push-buttons are used to prevent inadvertent operation	P
10.7	Devices for emergency stop		P
10.7.1	Location		P
	Devices for emergency stop shall be readily accessible	It is readily accessible	P
	Emergency stop devices shall be located at each operator control station and at other locations where the initiation of an emergency stop can be required	All of them are located at each operator control station	P
10.7.2	Type		P
	The type shall be of the self-latching type and shall have positive opening operation	A push-button operated switch	P

	Shall be of the self-latching type and shall have positive opening operation	Self-latching type and positive opening operation	P
10.7.3	Restoration of normal function after emergency stop		P
10.7.4	It shall not be possible to restore an emergency stop circuit until the emergency stop device has been manually reset	This requirement has been complied with	P
	Actuators		P
	Actuators of emergency stop devices shall be coloured RED.	RED	P
	The background immediately around the actuator shall be coloured YELLOW		P
10.7.5	Local operation of the supply disconnecting device to effect emergency stop		P
	The supply disconnecting device may be locally operated to serve the function of emergency stop when:		P
	- it is readily accessible toe the operator		P
	- it is of the type described in 5.3.2 a) ,b) or c)		P
	When intended for such use, the supply disconnecting device shall meet the colour requirements of 10.7.4		P
10.8	Devices for emergency switching off		P
	Devices for emergency switching off will be located separate from operator control stations	Pass muster	P
10.8.1	Location		P
10.8.2	Types	A push-button operated switch	P
	The devices shall be of the self-latching type and shall have positive opening operation	Pass muster	P
	The push-button operated switch may be in a break-glass enclosure		P
10.8.3	Restoration of normal function after emergency switching off		P
	It shall not be possible to restore an emergency switching off circuit until the emergency switching off device has been manually reset		P
10.8.4	Actuators		P
10.8.5	Actuators of emergency switching off devices shall be coloured RED		P
	Local operation of the supply disconnecting device to effect emergency switching off		P
	Where the supply disconnecting device is to be locally operated for emergency switching off, it shall be readily accessible and should meet the colour requirements of 10-8-4		P
10.9	Displays		P
	Displays shall be selected and installed in such a manner as to be visible from the normal position of the operator	Pass muster	P

	Where displays are intended to be warning devices, it is recommended that they be of the flashing or rotary type and be provided with an audible warning device		P

11	Electronic equipment		P
11.1	General		P
	This clause applies to all types of electronic devices including programmable electronic equipment, subassemblies, printed circuit boards, devices and components		P
11.2	Basic requirements		P
11.2.1	Inputs and outputs		P
	An indication of the status of all digital inputs and outputs should be provided	This function has been provided	P
11.2.2	Equipotential bonding		P
	All input/output racks, processor racks, and power supplies shall be electrically bonded together in accordance with the supplier's specifications and connected to the protective	According to the supplier's specifications	P
11.3	Programmable equipment		P
11.3.1	Programmable controllers		P
	Programmable controllers shall conform to relevant IEC standards	The controller used on these machines is in conformity with the requirements of EMC standards	P
11.3.2	Memory retention and protection		P
11.3.3	Means shall be provided to prevent memory alteration by unauthorized persons and the requirements detailed in 9.4.3.2 shall apply	The modification of the controller is only possible by authorized persons and the requirement in 9.4.3.2 has been applied	P
	Software verification		P
11.3.4	Equipment using reprogrammable logic shall have means for verifying that the software is in accordance with the relevant program documentation	This function has been provided	P
	Use in safety-related functions		P
	Programmable electronic equipment shall not be used for category 0 emergency stop functions	This requirement has been complied with	P

12	Controlgear: location, mounting, and enclosures		
12.1	General requirements		P
	All controlgear shall be located and mounted so as to facilitate:		P
	- its accessibility and maintenance		P
	- its protection against the external influences or conditions under which it is intended to operate		P
	- operation and maintenance of the machine and its associated equipment		P
12.2	Location and mounting		P

12.2.1	Accessibility and maintenance		P
	All items of controlgear shall be placed and oriented so that they can be identified without moving them or the wiring	All of them can be identified without moving or the wiring	P
	All controlgear shall be mounted so as to facilitate its operation and maintenance from the front		P
	Where access is required for regular maintenance or adjustment, the relevant devices shall be arranged between 0,3m and 2,0 m above the servicing level		P
	No devices except devices for operating, indicating, measuring, and cooling shall be mounted on doors and on normally removable access covers of enclosures		P
	Where control devices are connected through plug-in arrangements, their association shall be made clear by type, marking or reference designation, singly or in combination		P
	Plug-in devices that are handled during normal operation shall be provided with non-interchangeable features where the lack of such a facility can result in mulfunctioning	Pass muster	P
	Plug/socket combinations that are handled during normal operation shall be located and mounted so as to provided unobstructed access		P
12.2.2	Physical separation or grouping		P
	Non-electrical parts and devices not directly associated with the electrical equipment shall not be located within enclosures containing control gear	No this kind of parts or devices are located within enclosures containing control gear	P
	Devices such as solenoid valves should be separated from the other electrical equipment	No such solenoid valves	N
	Control devices mounted in the same location and connected to the supply voltage, or to both supply and control voltages, shall be grouped separately from those connected only to the control voltages	Appropriate separation has been taken	P
	Terminals shall be separated into groups for: - power circuits; - associated control circuits; - other control circuits, fed from external sources	They have been separated appropriately	P
	The clearances and creep distances specified for the devices shall be maintained	Appropriately clearances and creep distances have been provided	P
12.2.3	Heating effects	No heating effects	N
	Heating generating components shall be so located that the temperature of each component in the vicinity remains within the permitted limit		N
12.3	Degrees of protection		P
	The minimum degree of protection is IP40 for enclosures of switching devices of sewing units and systems		P
12.4	Enclosures, doors and openings		P

	Enclosure shall be constructed using materials capable of withstanding the mechanical, electrical and thermal stresses	The material (metal plate with painting) used for enclosure can withstand the mechanical, electrical and thermal stresses	P
	Fasteners used to secure doors and covers should be of the captive type	Captive type	P
	Windows provided for viewing internally mounted indicating devices shall be of a material suitable to withstand mechanical stress and chemical attach	No this kind of window	N
	It is recommended that enclosures doors shall have: - not wider than 0.9m - vertical hinges - lift-off type - angle of opening at least 95°	These requirement have been taken	P
	If enclosures which readily allow a peraon fully to enter, the relevant requirements specified in this clause shall be comply	No this kind of situation	N
	The joints or gaskets of doors, lids, covers and enclosures shall withstand the chemical effects of the aggressive liquids, vapours used on the machine	They can withstand the chemical effects of the aggressive liquids, vapours, or gases used on the machine	P
	The means used to maintain the degree of protection of an enclosure on doors, lids and covers that require opening or removal for operation or maintenance shall be secured	They can be secured firmly	P
	The degree of protection for all openings in the enclosures shall be secured	The degree of protection can be secured	P
	Openings for cable shall be easily re-opened on site	The can be re-opened easily	P
	There shall be no opening between enclosures containing electrical equipment and compartments containing coolant, lubricating or hydraulic fluids, or those into which oil, other liquids, or dust can penetrate	No this kind of opening has been found	N
	The requirement mentioned above does not apply to electrical devices specially designed to operate in oil nor to electrical equipoment in which coolants are used	No applicable	N
	Where there are holes in an enclosure for mounting purpose, the degree of protection for the enclosure shall be secured	Appropriate protection degree can be secured	P
	Equipment that, can attain a suiface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material, the relevant requirements shall be complied	No this kind of gangway has been found	N
12.5	Access to controlgear		P
	The minimum dimensions of gangways in front of and between controlgear shall be in accordance with 481.2.4 of IEC 60364-4-481		P

13	Conductors and cables		P
13.1	General requirements		P

	Conductors and cables shall be selected so as to be suitable for the operating conditions current, protection against electric shock, grouping and external influences	All of conductors and cables used on these machines are suitable for the operating conditions and external influences	P
13.2	Conductors		P
	Conductors shall be of copper	Copper	P
	Conductors of any other material shall have a nominal cross-sectional area such that, carrying the same current, the max, temerparure shall not exceed the value given in table 4	Only copper conductors are used	N
	If aluminium is used, the cross-sectional area shall be at least 16mm^2	Only copper conductors are used	N
	All conductors that are subject to frequent movement shall have flexible stranding of class 5 or class 6 (see table c.4)		P
13.3	Insulation		P
	The dielectric strength of the insulation shall be adequate for the test voltage required with a minimum of 2000V a.c. for 5min duration for cables operating at voltages higher than 50V a.c. or 120V d.c	This test has been carried out for the cables, and there is no breakdown is occurred	P
	The mechanical strength and thickness of the insulation shall be such that the insulation cannot be damaged in operation or during laying, especially for cables pulled into ducts	Appropriate insulation with sufficient mechanical strength and thickness is provided	P
13.4	Current-carrying capacity in normal service		P
	The cross-sectional area of a conductor shall be such that, under those conditions, the conductor temperature does not exceed the value given in table 4, unless otherwise specified by the cable manufacturer	No exceed temperature	P
	The current-carrying capacities for PVC insulated wiring between enclosure and individual items of equipment under steady0state conditions are given in Table 5		P
13.5	Conductor and cable voltage drop		P
	The voltage drop from the point of supply to the load shall not exceed 5% of the nominal voltage under normal operating conditions	Not exceed 5%	P
13.6	Minimum cross-sectional area		P
	To ensure adequate mechanical strength, the cross-sectional area of conductors should not be less than as shown in Table 6		P
13.7	Flexible cables	=	P
13.7.1	General		P
	Flexible cables shall have class 5 or class 6 conductors		P
	Cables that are subjected to server duties shall be of adequate construction		P
13.7.2	Mechanical rating		P
	The tensile stress for copper conductors shall not exceed 15N/mm^2 of the copper cross-sectional area		P

	If the demands of the application exceed the tensile stress, it of 15N/mm^2 , cables with special construction fertures should be used and the allowed max, tensile stress strength should be agree with the cable manufacturer		P
13.7.3	Current-carrying capacity of cables wound on drums		P
	Cables to be wound on drums shall be selected with conductors having a cross-sectional area such that, when fully wound on the drum and carrying the normal service load, the maximum allowable conductor temperature is not exceeded	Not exceeded	P
13.8	Collector wires, collector bars and slip-ring assemblies		
13.8.1	Protection against direct contact		
	Collector wires, collector bars and slip-ring assemblies shall be installed or enclosed by the applicantion of one of the following protective measures: - by partial insulation of live parts - by enclosures or barriers of at least IP2X		
	Min. Protector degree of horizontal top surface of barriers or enclosures that are readily accessible:IP4X		
	If the required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency swetching off according to 9.2.5.4.3 shall be applied		
	Collector wires and collector bars shall be so placed and/or protected as to : - prevent contact - prevent damage from a swinging load		
13.8.2	Protective conductor circuit		P
	The protective conductor(PE) and neutral conductor (N) shall each use a separate collector wise, collector bar or slip-ring	Pass muster	P
	The continuity of the protective conductor circuit using sliding contacts shall be ensured by taking appropriate measures		P
13.8.3	Protective conductor current collectors		P
	Protective conductor current collectors shall have a shape or construction so that they are not interchangeable with the other current collectors		P
13.8.4	Such current collectors shall be of the sliding contact type		P
	Removable current collectors with a disconnector function	No applicable	N
	Removable current collectors having a disconnector function shall be so designed that the protective conductor circuit is interrpted only after the live conductors have been disconnected ,and the continuity of the protective conductor circuit is re-estabilished before any live conductor is reconnected		N

13.8.5	Clearance in air	No applicable	N
13.8.6	Shall be sutable for operation in pollution degree 3 conditions		N
	Creepage distances		P
13.8.7	Shall be suitable for operation in pollution degree 3 conditions		P
	Conductor system sectioning		P
	If collector wires or collector bars can be divided into isolated sections, suitable design measures shall be employed to prevent the energization of adjacent sections by the current collectors themselves		P
13.8.8	Construction and installation of collector wire, collector bar systems and slip-ring assemblies	No applicable	N
	Collector wire, collector bar systems and slip-ring assemblies used for power circuits shall be grouped separately from those used for control circuits		N
	Removable covers for collector wire and collector bar sustems laid underground or underfloor shall be so designed that they cannot be opened by one person without the aid of a tool		N
	Undergroup and underfloor collector bar ducts shll have drainage facilities		N

14	Wiring practices		P
14.1	Connections and routing		P
14.1.1	General requirements		P
	All connections shall be secured against accidental loosening	All connections can be secured against accidental loosening	P
	The means of connection shall be suitable for the cross-sectional areas and neutral of the conductors being terminated	The means of connection is suitable	P
	The connection of two or more conductors to one terminal is permitted (only when the termianl is designed for that purpose)	No terminal has been connected with three or more conductors	P
	One protective bonding circuit conductor shall be connected to one terminal connecting point	One conductor connected to one terminal	P
	Soldered connections shall only be permitted if terminals are suitable forsoldering	No soldered connection has been taken	N
	Terminals on terminal blocks shall be plainly identified to correspond with markings on the diagrams	All of them have been marked corresponding to markings on the diagrams	P
	The installation of flexible conduits and cables shall be such that liquids shall drain away from the fittings	Liquids can drain away from the fittings	P
	Means of retaining conductor strands shall be provided (Solder shall not be used for that purpose)	By appropriate terminals	P
	Shielded conductors shall be so terminateds to prevent fraying of strands and to permit easy disconnection	Appropriate termination is taken	P
	Identification tags shall be legible, permanent, and appropriate for the physical environment	They are legible, permanent, and appropriate for the physical environment	P

	Terminal blocks shall be so mounted and wired, that the internal and external wiring does not cross over the terminals	No conductor cross over the terminals	P
14.1.2	Conductor and cable runs		P
	Conductor and cables shall be run from terminal to terminal without splices or joints	All of them are run from terminal to terminal without splices or joints	P
	Where it is necessary to connect and disconnect cables and cable assemblies, a sufficient extra length shall be provided for that purpose		P
	The terminations of cables shall be adequately supported to prevent mechanical stresses at the terminations of the conductors	Adequate support measure has been taken	P
14.1.3	Conductors of different circuits	No conductors of different circuits	N
	Conductors of different circuits may be laid side by side, may occupy the same duct, or may be in the same multiconductor cable provided that the arrangement does not impair the proper functioning of the respective circuits		N
14.2	Identification of conductors		P
14.2.1	General requirements		P
	Conductors shall be identifiable at each termination in accordance with the technical documentation	Make reference to clause 18	P
	Use of color-coding for identification of conductors	Color-coding for identification is used	P
	Color GREEN or YELLOW should hot be used	No GREEN or YELLOW conductor is used	P
14.2.2	Identification of the protective conductor		P
	The protective conductor shall be readily distinguishable by shape, location, marking ,or color	By marking and color	P
	For insulated conductors, the bicolour combination GREEN-AND-YELLOW shall be such that on any 15mm length one of the colours covers at least 30% and not more than 70% of the surface of the conductor, the other covering the remainder of the surface	By GREEN-AND-YELLOW	P
	Use of graphical symbol: ⏚	The earthing symbol has been used	P
14.2.3	Identification of the neutral conductor	No neutral conductor is used	N
14.2.4	Where a circuit includes a neutral conductor identified by colour, the colour shall be LIGHT BLUE		N
	Identification of other conductors		N
	Identification of other conductors shall be by colour, number, alphanumeric, or a combination of colour and numbers or alphanumeric		N
	Conductors used for functional earthing shall be identified by the colour GREY		N
	Common conductors, for example for eliminating static charges, shall be identified by colour GREY		N
14.3	Wiring inside enclosures		P
	Panel conductors shall be supported where necessary to keep them in place	Appropriate supports are provided	P

	Non-metallic ducts shall be permitted only when they are made with a flame-retardant insulating material	Some non-metallic ducts are used with a flame-retardant insulating material	P
	Connections to devices mounted on doors or to other movable parts shall be made using flexible conductors according to 13.2		P
	The conductors shall be anchored to the fixed part and to the movable part independently of the electrical connection	Adequate anchored measures have been taken	P
	Conductors and cables that do not run in ducts shall be adequately supported	All of them have been supported adequately	P
	Terminal blocks or plug/socket combinations shall be used for control wiring that extends beyond the enclosure	This application has been taken	P
14.4	Wiring outside enclosures	Not wiring outside enclosures	N
14.4.1	General requirements		N
	The means of introduction of cables or ducts with their individual glands, bushings, etc., into an enclosure shall ensure that the degree of protection is nor reduced		N
14.4.2	External ducts		N
	Fitting used with ducts or multiconductor cable shall be suitable for the physical environment		N
	Flexible conduit or flexible multiconductor cable shall be used for connections involving small or infrequent movements		N
	The weight of the pendant stations shall be supported by means other that the flexible conduit or the flexible multiconductor cable		N
	Flexible conduit or flexible multiconductor cable shall be sued for connections involving small or infrequent movements		N
14.4.3	Connection to moving elements of the machine		N
	Connections to frequently moving parts shall be made using conductors in accordance with 13.2		N
	Cables subject to movement shall be supported in such a way that there is no mechanical strain on the connection points nor any sharp flexing		N
	The cable sheath shall be resistant to the normal wear that can be expected from movement and to the effects of atmospheric contaminants		N
	Where cables subject to movement are close to moving parts ,precautions shall be taken to maintain a space of at least 25mm between the moving parts and the cables		N
	The cable handling system shall be so designed that lateral cable angles do not exceed 5° , avoiding torsion in the cable :test		N
	Devices serving to guide and carry a flexible cable shall be so designed that the inner bending radius at all points where the cable is bent is not less than the values given in Table 8		N
14.4.4	Interconnection of devices on the machine		N

	Such terminals shall be conveniently placed, adequately protected, and shown on the relevant diagrams		N
14.4.5	Plug/socket combinations		N
	Where equipment is removable, connections to is through a polarized plug/socket combination are permitted		N
	Plug/socket combinations shall be of such a type and so installed to prevent unintentional contact with live parts at any time even during insertion or removal of the connectors		N
	Plug/socket combinations that are rated at more than 16A or that remain connected during normal service shall be of a retaining type to prevent unintended disconnection		N
	Where more than one plug/socket combination is used in the same electrical equipment, they shall be clearly identifiable		N
14.4.6	Dismantling for shipment		N
14.4.7	Plug/socket combinations shall be protected from the physical environment during transportation and storage		N
	Additionsal conductors		N
	Spare conductors shall be connected to spare terminals or isolated to prevent contact with live parts		N
14.5	Ducts, connection boxes and other boxes		P
14.5.1	General requirements		P
	Ducts shall provide a minimum degree of protection of IP33		P
	Appropriate protection for conductors insulation	Suitable protection is taken	P
	Drain holes of 6mm diameter are permitted		P
	Ducts and cables trays shall be rigidly supported and positioned at a sufficient distance from moving parts	Suitable support and sufficient distance have been taken	P
	In areas where human passage is required, the ducts and cable trays shall be mounted at least 2m above the working surface	No this kind of area	N
	Ducts shall be provided only for mechanical protection	Adequate mechanical protection is provided	P
	Cable trays that are partially covered should not be condidered to be ducts or cable trunking system, and the cables used shall be suitable for installation on cable trays		P
14.5.2	Percentage fill of ducts		P
14.5.3	The dimensions and arrangement of the ducts be such as to facilitate the insertion of the conductors and cables	This requirement has been complied with	P
	Rigid metal conduit and fittings	No rigid metal conduit is used	N
	Rigid metal conduit and firings shall be of galvanized steel or of a corrosion-resistant material suitable for the conditions		N

	Conduits shall be securely held in place and supported at each end		N
	Fittings shall be compatible with the conduit and appropriate for the application		N
	Conduit bends shall be made in such a manner that the conduit shall not be damaged and the internal diameter of the conduit shall not be effectively reduced		N
14.5.4	Flexible metal conduit and fittings	No rigid metal conduit is used	N
	A flexible metal conduit shall consist of a flexible metal tubing or woven wire armour		N
	Fittings shall be compatible with the conduit and appropriate for the application		N
14.5.5	Flexible non-metallic conduit and fittings	No flexible non-metal conduit is used	N
14.5.6	A flexible non-metallic conduit shall be resistant to kinking and shall have physical characteristics similar to those of the sheath of multiconductor cables		N
	Cable trunking systems	No cable trunkling system is used	N
	Cable trunking systems external to enclosures shall be rigidly supported and cleat of all moving or contaminating portions of the machine		N
	Covers shall be shaped to overlap the sides; gaskets shall be permitted		N
	On horizontal cable trunking systems, the cover shall not be on the bottom		N
	Where the cable trunking system is furnished in sections, the joints between sections shall fit tightly but need not be gasketed		N
	The only openings permitted shall be those required for wiring or for drainage		N
14.5.7	Machine compartments and cable trunking systems	No this kind of situation	N
	Are isolated from coolant or oil reservoirs and are entirely enclosed		N
14.5.8	Conductors run in enclosed compartment and cable trunking systems shall be so secured and arranged that they are not subject to damage		N
	Connection boxes and other boxes		P
	Connection boxes and other boxes used for wiring purposes shall be readily accessible for maintenance	They are readily accessible for maintenance	P
	shall provide protection against the ingress of solid bodies and liquids	Adequate protection is provided	P
	Those boxes shall not have opened but unused knockouts nor any other openings and shall be so constructed as to exclude materials such as dust, flyings, oil, and coolant	These requirements have been complied with	P
14.5.9	Motor connection boxes		P

	Motor connection boxes shall enclose only connections to the motor and motor-mounted devices	They enclose only connections to the motor and motor-mounted devices	P

15	Electric motors and associated equipment		P
15.1	General requirements		P
	Electric motors should conform to the requirements of IEC60034-1	The electric motor is in conformity with the requirements of IEC 60034-1	P
	Motor control equipment shall be located and mounted according to clause 12		P
15.2	Motor dimensions		P
	It is recommended that motor enclosures be chosen from those included in IEC60034-5		P
	The degree of protection shall be at least IP23 for all motors		P
	The minimum degree of protection of the sewing machine drive shall be IP40		P
15.3	Motor dimensions		P
15.4	As far as is practicable, the dimensions of motors shall conform to those given in IEC 6072-1 and IEC60072-2	It is in compliance with IEC 60072-1 and IEC 60072-2	P
	Motor mounting and compartment		P
	Each motor and its associated couplings, belts and pulleys, or chains, shall be so mounted that they are adequately protected and are easily for inspection	They have adequate protection and are easily for inspection	P
	Shall be such that all motor hold-down means can be removed and all terminal boxes are accessible	This requirement has been complied with	P
	The proper cooling shall be ensured and the temperature rise remains within the limits of the insulation class	This requirement has been complied with	P
	Motor compartment should be clean and dry, and shall be ventilated directly to the exterior of the machine	Pass muster	P
	The vents shall be such that ingress of swarf, dust, or water spray is at an acceptable level	Adequate vents are provided	P
	There shall be no opening between the motor compartment and any other compartement that does not meet the motor compartment requirements	Pass muster	P
	If a conduit or pipe is run into the motor compartment from another compartment not meet the motor compartment requirements, any clearance around the conduit or pipe shall be sealed	No this kind of situation	N
15.5	Criteria for motor selection		P
15.6	Shall be selected according to the anticipated service and physical environment conditions	They are selected according to the anticipated service and physical environment conditions	P
	Protective devices for mechanical brakes		P
	Operation of the overload and overcurrent protective devices for mechanical brake actuators shall initiate the simultaneous de-energization of the associated machine actuators	Provide overcurrent protective	P

16	Accessories and lighting		N
16.1	Accessories		N
	Socket-outlets for accessory equipment shall comply:	Not such socket-outlets	N
	Should conform to IEC 60309-1 (if this is not possible, they should be clearly marked with the voltage and current ratings)		N
	The continuity of the protective bonding circuit to the socket-outlet shall be ensured		N
	All unearthed conductors: over current or overload protection according to 7.2 and 7.3 separately from the protection of other circuits		N
	If the power supply to the socket outlet is not disconnected by the supply disconnecting device, the clause 5.3.5 shall apply		N
16.2	Local lighting of the machine and equipment	No such local lighting	N
	Connections to the protective bonding circuit shall be in accordance with 8.2.2		N
	The ON-OFF switch shall not be incorporated in the lampholder or in the flexible connecting cords		N
	Stroboscopic effects from lights shall be avoided by the use of appropriate luminaires		N
	Where fixed lighting is provided in an enclosure, electromagnetic compatibility should be taken into account using the principles outlined in 4.4.2		N
16.2.2	Supply		N
	It is recommended that the nominal voltage of the local lighting circuit should not exceed 50V between conductors		N
16.2.3	Protection		N
16.2.4	Operators during circuits shall be protected in accordance with 7.2.6		N
	Fittings		N
	Adjustable lighting fittings shall be suitable for the physical environment		N
	Reflectors shall be supported by a bracket and not by the lampholder		N

17	Marking, warning signs and reference designations		P
17.1	General		P
	The electrical equipment shall be marked with the supplier’s name ,trade mark, or other identifying symbol and, when required, with a certification mark	These information have been marked	P
	Warning signs, nameplates, markings, and identification plates shall be of sufficient durability to withstand the physical environment involved	They can withstand the physical environment involved	P
17.2	Warning signs		P

	Enclosures shall be marked with the warning sign: 	This warning sign has been used	P
	The warning sign shall be plainly visible on the enclosure door or cover	It is plainly visible on the enclosure door	P
17.3	Functional identification		P
	Control devices, visual indicators and displays, used in man-manchine interface shall be clearly and durably marked with regard to their functions either on or adjacent to the item	Appropriate markings have been provided for these devices	P
	Preference should be given to the use of standard symbols give in IEC 60417 and ISO 7000	These relevant requirements appropriate for this machine have been used	P
17.4	Marking of control equipment		P
	Control equipment shall be legibly and durably marked in a way that is plainly visible after the equipment is installed	They have been marked legibly and durably	P
	The full-load current shown on the nameplate shall be not less than the combined full-load currents for all motors and other equipment that can be in operation at the same time under normal conditions of use	A nameplate is used	P
	Where only a single motor controller is used, that information may instead be provided on the machine nameplate where it is plainly visible		P
17.5	Reference designations		P
	All enclosures, assemblies, control devices, and components shall be plainly identified with the same reference designation as shown in the technical documentation that shall be in accordance with IEC61346-1	These information have been provided within the instruction manual	P
	Where size or location preclude the use of an individual reference designation, group reference designation shall be used		P

18.	Technical documentation		P
18.1	General		P
	The information necessary for installation, operation, and maintenance of the electrical equipment of a machine shall be supplied in the form of drawing ,diagrams, charts, tables ,and instructions	All the information have been provided by many forms	P
	The information shall be in an agreed language	English	P
	The supplier shall be ensure that the technical documentation in this clause is provided with each machine	The instruction manual is equipped with each machine	P
18.2	Information to be provided		P
	The information provided with the electrical equipment shall include the requirements specified in this clause		P
18.3	Requirements applicable to all documentation		P

	Relevant requirements according to 18.4 to 18.10 shall be complied		P
18.4	Basic information		P
18.5	Min. requirements for the technical documentation shall be contained		P
	Installation diagram		P
	The recommended position, type, and cross-sectional areas of the supply cables to be installed on site shall be clearly indicated		P
	The size, and purpose of ducts, cable trays, or cable supports between the machine and the associated equipment that are to be provided by the user shall be detailed		P
18.6	Block(system) diagrams and function diagrams		P
18.7	Use and requirements for system(block) diagram	Installation diagrams are provided	P
	Circuit diagrams	Circuit diagrams are provided	P
	Use and requirements for circuit diagrams		P
18.8	Operating manual		P
	The technical documentation shall contain an operating manual detailing proper procedures for set-up and use of the equipment		P
	Where the operation of the equipment can be programmed, detailed information on methods of programming, equipment required, program verification, and additional safety procedures shall be provided		P
18.9	Maintenance manual		P
18.10	The technical documentation shall contain a maintenance manual detailing proper procedures for adjustment, servicing and prevnetive inspection, and repair	Maintenance manual is provided	P
	Parts list	Parts list is provided	P
	Use and requirements for parts list		P

19.	Testing and verification		P
19.1	General		P
	When these tests are performed, it is recommended that they follow the sequence listed	All tests have been carried out according to the following sequence	P
	When the electrical equipment is modified, the requirements stated in 19.7 shall apply		P
19.2	Continuity of the protective bonding circuit		P
	Test conditions: a current of at least 10A at 50Hz OR 60Hz		P
19.3	The measured voltage shall not exceed the values given in table 9		P
	Insulation resistance tests		P

	Test conditions : 500 V d.c		P
	The measured values shall not less than 1MΩ	See the test report in detail	P
19.4	Voltage tests		P
	Test conditions: - at least 1 second - test voltage is twice the raged supply voltage of the equipment or 1000V, whichever is greater - frequency of 50/60Hz - supplied from a transformer with a min.rating of 500V/A		P
	Shall not breakdown	See the test report in detail	P
19.5	Protection against residual voltages		N
	Tests are performed to ensure compliance with 6.2.4		N
19.6	Functional tests		P
	The functions of electrical equipment shall b tested ,particularly those related to safety and safeguarding	All functions equipped with this machine have been tested	
19.7	Retesting		N
	Where a portion of the machine and its associated equipment is changed or modified, that portion shall be reverified and retested, as is appropriate		N

Annex			P
Annex A	examples of machines covered by this part of IEC 60204		P
Annex B	inquiry form for the electrical equipment of machines		P
Annex C	current-carrying capacity and overcurrent protection of conductors and cables in the electrical equipment of machines		P
	The purpose of this annex is to provide additional information on the selection of conductor sizes where the conditions given Table 5 have to be modified		P
Annex D	explanation of emergency operation functions		P
	Emergency stop		P
	Emergency start		P
	Emergency switching off		P
	Emergency switching on		P
Annex E	bibliography		P

19.3	Insulation resistance measurements	P

Insulation resistance R between:	Measurement(MΩ)	Requirement(MΩ)
Between the power circuit conductors and the protective bonding circuit	5	1

19.4	TABLE: electric strength measurements	P
Test voltage applied between:	Test voltage (V)	Breakdown
Between the conductors of all circuits and the protective bonding circuit	AC 1,000V rms	No

Photos of the sample

LIST OF INSTRUMENTS				
NO	Equipment name	Type	Serial NO	period of validity
1	Digital Ac Power Source	6200 series	Angui-004	2017.11.15
2	Radiation Tester	440RF/D	Angui-006	2017.12.9
3	Line Leakage Tester	7620	Angui-008	2017.11.14
4	Electrical Safety Compliance Analyzer	7452	Angui-011	2017.11.14
5	Safely-Testing Instrument	ST-1001	Angui-012	2017.11.22
6	Digital Display Caliper	0.01㎜	Angui-014	2017.11.23
7	Dual Display LCR Instrument	ELC-131D	Angui-161	2017.11.22
8	Impact Testing Hammer	ST-1002	Angui-017	2017.11.29
9	Surge-Insulation Tester	NF2675	Angui-019	2017.11.19
10	Lecroy Storage Oscillocope	9304A	Angui-020	2017.11.7
11	Trillion-Ohm Instrument	ZC25B-3	Angui-022	2017.11.15
12	Digital Temperature Tester	DR030	Angui-024	2017.11.7
13	Program Control Combustion Instrument	CS-1	Angui-032	2017.11.29
14	Torque Driver	RTD60CN	Angui-036	2017.11.23
15	Digital Micrometer		Angui-013	2017.11.14
16	Pushing Tube-Shaped Ergometer	KL-10	Angui-038	2017.11.14
17	Noncontact Thermometer	ST60	Angui-156	2017.11.14
18	Dynamometer	KL-2	Angui-040	2017.11.23

19	Dynamometer	TK-30	Angui-044	2017.11.23
20	Alternating Moisture Testing Instrument	SDJ020	Angui-050	2017.11.23
21	Measuring Instrument For Temperature Raise Of Live Windings	RC-3	Angui-150	2017.11.23
22	Audio Analyzer	VP-7720A	YPL03-01	2017.11.14
23	FM/AM Signal Generator	VP-8179B10	YXH01-01	2017.11.14
24	FM/AM Signal Generator	VP-8179B10	YXH01-02	2017.11.14
25	Frequency Counter	500A	YPL-05-01	2017.11.23
26	Muitiplex Srereo Modulator	VP-7633A	YQT23-01	2017.11.23
27	WOW Flutter Meter	MK-668E	YDBW03-01	2017.11.23

EC Declaration of conformity

Council Directive 2006/42/EC Machinery Directive

Applicant: Teknatool International Limited
Address: 7D Dallan Place,Rosedale,Auckland,0632,NZ

Manufacturer: Laizhou Planet Machinery Co. Ltd
Address: Yutai Road South, Gangchenglu Street, Laizhou, Shandong

Certify that the product described is in conformity with the Directive 2006/42/EC as amended

Product Name:
DVR Headstock

Model:
DVR16XX、 DVR18XX、DVR20XX、DVR22XX

The product has been assessed by the application of the following standards:

EN ISO12100:2010

EN 60204-1:2006+A1:2009+AC:2010

_____
Issue place and date

_____
Company stamp and Signature of authorized personnel