Test Report

Application No. : SIBOASI-2016009-A1

Product Name : Ball machine

Test Model(s) : T5

Test Date : 18th Jan, 2016

Applicant : Dongguan Humen SIBOASI Sports Machinery Factory

Test Lab.:

Guangzhou Houte Equipment Testing Technology Co., Ltd.

TEST REPORT

Report reference No..... :	SIBOASI-2016009-A1
Date of issue..... :	22nd Jan, 2016
Testing laboratory..... :	Guangzhou Houte Equipment Testing Technology Co., Ltd.
Address..... :	Room 1101, No.320, Tancun Road, Zhujiang Newtown, Guangzhou City
Type of test object..... :	Ball machine
Model and/or type reference..... :	T5, S2015, T2015, D2015, S3015, T3015, D3015, S4015, T4015, D4015, S2025, T2025, D2025, S3025, T3025, D3025, S4025, T4025, D4025, YS-9000, T669, T829, T628, T326, T899, D2326, D669, D899, D2268, D558, TW2025, TY2025, TD2025, D2526, D2899, D5899, T6988, T6989, T8698, T8898
Applicant..... :	Dongguan Humen SIBOASI Sports Machinery Factory
Address..... :	Fuma Industry Area, Chigang, Humen Town, Dongguan
Manufacturer..... :	Dongguan Humen SIBOASI Sports Machinery Factory
Address..... :	Fuma Industry Area, Chigang, Humen Town, Dongguan
Standard..... :	EN 60204-1:2006/AC:2010 EN ISO 12100:2010
Test Report Form No..... :	EN ISO 60204-1Rev. 01
Test procedure..... :	CE
Test Result..... :	Pass

Compiled by....: Amy Xu (+ signature) Amy Xu	Approved by... : Sunny Chen (+ signature) Sunny Chen

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)

Attachments: The covering models are almost the same with the test model, except for the power and appearances.

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.

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Risk assessment

Risk assessment Methodology

The risk assessment is based on a method recommended in ISO/TR14121-2:2007, in which the factors Se-CI(Fr, Pr, Av) and diagram are used to evaluate the level of risk. The meaning of those is described in the following:

(1) Se, severity of the possible harm:

1: Scratches, bruises that are cured by first aid or similar.

2: More severe scratches, bruises, stabbing which require medical attention from professionals.

3: Normally irreversible injury; it will be slightly difficult to continue work after healing.

4: Irreversible injury in such a way that it will very difficult to continue work after healing, if possible at all.

(2) Fr, average interval between frequency of the exposure and its duration:

1: Interval between exposure is more than a year.

2: Interval between exposure is more than two weeks but less than or equal to a year.

3: Interval between exposure is more than a day but less than or equal to two weeks.

4: Interval between exposure is more than an hour but less than or equal to a day. Where the duration is short than 10 min, the above values may be decreased to the next level.

5: Interval less than or equal to an hour. This value is not to be decreased at any time.

(3) Pr, possibility of occurrence of a hazardous event:

1: Negligible: for example, this kind of component never fails so that a hazardous event occurs. No possibility of human error.

2: Rarely: for example, it is unlikely that this kind of component will fail so that a hazardous event occurs. Human error is unlikely.

3: Possible: for example, this kind of component can fail so hazardous event occurs. Human error is possible.

4: Likely: for example, this kind of component will probably fail so a hazardous event occurs. Human error is likely.

5: Very High: for example, this kind of component is not made for this application. It will fail so that a hazardous event occurs. Human behavior is such that the likelihood of error is very high.

(4) Av, possibility of avoiding or limiting harm:

1: Likely: for example, it is likely that contact with moving parts behind and inter locked guard will be avoided in most cases should the interlocking fail and the movements continue.

2: Possible: for example, it is possible to avoid an entanglement hazard where the speed is slow.

3: Impossible: for example, it is impossible to avoid the sudden appearance of a powerful laser beam or a part of machine becoming live because of a fault in electrical insulation.

The risk is evaluated by using the matrix as below:

Severity Se	**Class CI (Fr+Pr+Av)**				
	3-4	**5-7**	**8-10**	**11-13**	**14-15**
4					
3					
2					
1					

Where the severity, Se, cross the class, CI:

In the black area, protective measures have to be implemented to reduce risk;

In the gray area, protective measures are recommended to be implemented to further reduce risk;

In the remaining area, the risk is already adequately reduced.

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
1. Mechanical							
1.1		6.2.2.1	Being run over	-	N/A	-	-
1.2		6.2.2.2	Being thrown	-	N/A	-	-
1.3	1.3.7	6.2.3 a) 6.2.3 b) 6.2.6	Crushing	1. Commissioning 2. Operation	1. When access the moving clamping mechanism area.	Se 4, Fr 4, Pr 3, Av 3; Cl 10	Fixed guard and light curtain provided, the machine will access to the danger area.
1.4	1.3.4	6.2.10 6.3.1 6.3.2	Cutting or severing	1. Commissioning 2. Operation	1. When access the rotation Milling area.	Se 4, Fr 4, Pr 3, Av 3; Cl 10	Fixed guard and light curtain provided, the machine will access to the danger area.
1.5	1.3.7	6.3.3	Drawing in or trapping	-	N/A	-	-
1.6	1.3.7	6.3.5.2	Entanglement	-	N/A	-	-
1.7		6.3.5.4	Friction, abrasion	-	N/A	-	-
1.8		6.3.5.5	Impact	-	N/A	-	-
1.9		6.3.5.6	Injection	-	See 16.2 below	-	-
1.10	1.3.7	6.4.1	Shearing	-	N/A	-	-
1.11	1.5.15	6.4.3	Slip, trip, and fall of person	-	N/A	-	-
1.12		6.4.4	Stabbing or puncture	-	N/A	-	-
1.13		6.4.5	Suffocation	-	N/A	-	-
2. Electrical							
2.1		6.2.9 6.3.2 6.3.3.2 6.3.5.4 6.4.4 6.4.5	Burn	-	See 17 below	-	-
2.2			Chemical effects	-	See 17 below	-	-
2.3			Effects on medical implants	-	See 17 below	-	-
2.4			Electrocution	-	See 17 below	-	-
2.5			Falling, being thrown	-	See 17 below	-	-
2.6			Fire	-	See 17 below	-	-
2.7			Projection of molten particles	-	See 17 below	-	-
2.8			Shock	-	See 17 below	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
3. Thermal							
3.1	1.5.5	6.2.4 b) 6.2.8 c) 6.3.2.7 6.3.3.2.1 6.3.4.5	Burn	-	N/A	-	-
3.2			Dehydration	-	N/A	-	-
3.3			Discomfort	-	N/A	-	-
3.4			Frostbite	-	N/A	-	-
3.5			Injuries by the radiation of heat sources	-	N/A	-	-
3.6	1.5.5		Scald	-	N/A	-	-
4. Noise							
4.1		6.2.2.2 6.2.3 c) 6.2.4 c) 6.2.8 c) 6.3.1 6.3.2.1 b) 6.3.2.5.1 6.3.3.2.1 6.3.4.2 6.4.3 6.4.5.1 b) and c)	Discomfort	-	N/A	-	-
4.2			Loss of awareness	-	N/A	-	-
4.3			Loss of balance	-	N/A	-	-
4.4			Permanent hear loss	-	N/A	-	-
4.5			Stress	-	N/A	-	-
4.6			Tinnitus	-	N/A	-	-
4.7			Tiredness	-	N/A	-	-
4.8			Any other (e.g. mechanical, electrical) as a consequence of an interference with speech communication or with acoustic signals	-	N/A	-	
5. Vibration							
5.1		6.2.2.2 6.2.3 c) 6.2.8 c) 6.3.3.2.1 6.3.4.3 6.4.5.1 c)	Discomfort	-	N/A	-	-
5.2			Low-back morbidity	-	N/A	-	-
5.3			Neurological disorder	-	N/A	-	-
5.4			Osteo-articular disorder	-	N/A	-	-
5.5			Trauma of the spine	-	N/A	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
5.6			Vascular disorder	-	N/A	-	-
6. Radiation							
6.1		6.2.2.2 6.2.3 c) 6.3.3.2.1 6.3.4.5 6.4.5.1 c)	Burn	-	N/A	-	-
6.2			Damage to eyes and skin	-	N/A	-	-
6.3			Effects on reproductive capability	-	N/A	-	-
6.4			Genetic mutation	-	N/A	-	-
6.5			Headache, insomnia, etc.	-	N/A	-	-
7. Material / substance							
7.1		6.2.2.2 6.2.3 b) 6.2.3 c) 6.2.4 a) 6.2.4 b) 6.3.1 6.3.3.2.1 6.3.4.4 6.4.5.1 c) 6.4.5.1 g)	Breathing difficulties, suffocation	-	N/A	-	-
7.2			Cancer	-	N/A	-	-
7.3			Corrosion	-	N/A	-	-
7.4			Effects on reproductive capability	-	N/A	-	-
7.5			Explosion	-	N/A	-	-
7.6			Fire	-	N/A	-	
7.7			Infection	-	N/A	-	-
7.8			Mutation	-	N/A	-	-
7.9			Poisoning	-	N/A	-	-
7.10			Sensitization	-	N/A		-
8. Ergonomic							
8.1		6.2.2.1 6.2.7 6.2.8 6.2.11.8 6.3.2.1 6.3.3.2.1	Discomfort	-	N/A	-	-
8.2			Fatigue	-	N/A	-	-
8.3			Musculoskeletal disorder	-	N/A	-	-
8.4			Stress	-	N/A	-	-
8.5			Any other (e.g. mechanical, electrical) as a	-	N/A	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
			consequence of human error				
9. Associated with environment in which the machine is used							
9.1		6.2.6 6.2.11.11 6.3.2.1 6.4.5.1 b)	Burn	-	N/A	-	-
9.2			Slight disease	-	N/A	-	-
9.3			Slipping, falling	-	N/A	-	-
9.4			Suffocation	-	N/A	-	-
9.5			Any other as a consequence of the effect caused by the sources of the hazards on the machine or parts of the machine	-	N/A	-	-
10. Hazard combination							
10.1		-	E.g. dehydration, loss of awareness het stroke	-	N/A	-	-
11. shape and/or superficial finishing of accessible parts of the machine							
11.1		6.2.2.1	Contact with rough surfaces	-	N/A	-	-
11.2			Contact with sharp edges and corners, protruding part	-	N/A	-	-
12. Moving parts of machine							
12.1		6.2.2, 6.2.14, 6.2.15 6.3.1 to 6.3.3 6.3.5.2 to 6.3.5.4 6.4.3 to 6.4.5	Contact with moving parts	-	N/A	-	-
12.2			contact with rotating open ends	-	N/A	-	-
13. Kinetic energy and/or potential energy (gravity) of the machine, tools and materials used, processed, handled							
13.1		6.2.3, 6.2.5 6.2.10 to 6.2.12 6.3.2.1, 6.3.2.2 6.3.2.7 6.3.3 6.3.5.2, 6.3.5.4,	falling or ejection of objects	-	N/A	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
		6.3.5.5 6.4.4, 6.4.5					
14. Stability of the machine and/or parts of the machine							
14.1	1.3.1	6.2.3 a) and b) 6.2.6 6.3.2.6, 6.3.2.7 6.4.3 to 6.4.5	Loss of stability	-	Machine is always in stable position	-	-
15. Mechanical strength of parts of the machine, tools, etc.							
15.1	1.3.2	6.2.3 a) and b) 6.2.11, 6.2.13 6.3.2, 6.3.2.7 6.3.3.1 to 6.3.3.3 6.3.5.2, 6.4.4, 6.4.5	Break-up during operation	-	N/A	-	-
16. Pneumatic, hydraulic equipment							
16.1		6.2.3 a) and b) 6.2.10, 6.2.13, 6.3.2.7 6.3.3.1 to 6.3.3.3 6.3.5.4, 6.4.4, 6.4.5	displacement of moving elements	-	N/A	-	-
16.2	1.3.2		High pressure fluid injection or ejection	-	N/A	-	-
16.3			Uncontrolled movements	-	N/A	-	-
17. Electrical equipment							
17.1	1.5.1	6.2.4 a) 6.2.9, 6.2.12 6.3.2, 6.3.3, 6.3.5.4 6.4.4, 6.4.5	Direct contact	1. Installation, commissioning 2. Setting 3. Maintenance 4. Fault finding, troubleshooting	With live terminals in the control cabinets and motors.	Se 4, Fr 3, Pr 3, Av 3, Cl 9	1. Operation panel with good characteristics to prevent creepage and water, and worked with PELV 2. Maintenance by regular electrician 3. Fully enclosed control cabinets, for main electrical cabinet, when open the cabinet, the power will cut off, for second cabinet, only

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
							authorized person with key can open it, finger guards provided where appreciate. For more detail, please see EN 60204-1 test report. 4. Motors are enclosed by fixed and have enclosed terminal blocks, moreover the earthing has been provided.
17.2			Disruptive discharge	-	See 17.6 below	-	
17.3			Electric arc	-	N/A	-	
17.4			Fire	-	N/A	-	
17.5	1.5.2		Indirect contact	-	When insulation failures	Se 4, Fr 6, Pr 2, Av 3; CI 11	1. Enhanced or double insulation with current breakers. 2. Approved under-voltage contactors are used. 3. earthing the accessible metal.
17.6			Short-circuit	-	-	-	Approved breakers with overcurrent protection functions are fitted.
18. Control system							
18.1		6.2.5 6.2.11 to 6.2.13 6.3.5.2 to 6.3.5.4 6.4.3 to 6.4.5	Dropping or ejection of a moving part of the machine or of a workpiece clamped by the machine	-	N/A	-	-
18.2			Failure to stop moving parts	-	N/A	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
18.3			Machine action resulting from inhibition (defeating of failure) of protective devices	-	N/A	-	-
18.4			Uncontrolled movements (including speed changes)	-	N/A	-	-
18.5			Unintended/ unexpected start-up	Operation/ Operating manual mode, semi-automatic mode, automatic mode	If power source off and resume, the machine would start up automatically	Se 4, Fr 3, Pr 3, Av 3; Cl 9	1. Contactors fitted in the main motor circuit 2. Approved components are applied in the circuits
18.6	1.2.1, 1.2.7		Other hazardous events due to failure (s) or poor design of the control system	-	N/A	-	-
19. Materials and substances or with physical factors (temperature, noise, vibration, radiation and environment)							
19.1		6.2.2.2 6.2.3 c) 6.2.4 6.2.8 6.3.1 6.3.3.2 6.3.4 6.4.3 to 6.4.5	Contact with objects with high or low temperature	-	N/A	-	-
19.2			Emission of a substance that can be hazardous	-	N/A	-	-
19.3			Emission of a level of noise that can be hazardous	-	N/A	-	-
19.4			Emission of a level of noise that can interfere with a speech communication or with acoustic signals	-	N/A	-	-
19.5			Emission of a level of vibration that can be hazardous	-	N/A	-	-

No.	EHSR	Subclause of EN ISO 12100	Hazard/ Hazardous event	Life cycle/ Tasks	Hazardous situation	Risk Estimation	Risk reduction and protective measures
19.6			Emission of a level of radiation fields that can be hazardous	Operation	Unintended movement due to the environment EMI affection on the control system	Se 4, Fr 6, Pr 2, Av 3; Cl 11	EMC and EMI safety performance is verified based on the Declaration of EMC Conformity issued by the supplier.
19.7			Harsh environmental conditions	-	Machine operates only in a normal natural environment	-	-
20. Workstation and/or process design							
20.1	1.1.2d, 1.1.5 1.2.2	6.2.2.1 6.2.7, 6.2.8 6.2.11.8 6.3.5.5, 6.3.5.6 6.4.3 to 6.4.5	Excessive efforts	-	N/A	-	-
20.2			Human errors/misbehaviour (unintentional and/or deliberately induced by the design	-	N/A	-	-
20.3			Loss of direct visibility of the working area	-	N/A	-	-
20.4			Painful and tiring postures	-	N/A	-	-
20.5			Repetitive handling at high frequency	-	N/A	-	-

EN ISO 12100 test report

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
5	**Risk assessment**		**Pass**
5.1	**General** Risk assessment comprises (see Figure 1)	See risk assessment report	Pass
	-Risk analysis, comprising	See risk assessment report	Pass
	1) determination of the limits of the machinery (see 5.3),	See risk assessment report	Pass
	2) hazard identification (5.4 and Annex B), and	See risk assessment report	Pass
	3) risk estimation (see 5.5), and	See risk assessment report	Pass
	-Risk evaluation (see 5.6).	See risk assessment report	Pass
	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.	See risk assessment report	Pass
	These judgments shall be supported by a qualitative or, where appropriate, quantitative estimate of the risk associated with the hazards present on the machinery.	See risk assessment report	Pass
	NOTE A quantitative approach can be appropriate when useful data is available. However, a quantitative approach is restricted by the useful data that are available and/or the limited resources of those conducting the risk assessment. Therefore, in many applications only qualitative risk estimation will be possible.	Noted	Pass
	The risk assessment shall be documented according to Clause 7.	See risk assessment report	Pass
5.2	**Information for risk assessment**	-	-
	The information for risk assessment should include the following.	See risk assessment report	Pass
	a) Related to machinery description:	See risk assessment report	Pass
	1) user specifications;	See risk assessment report	Pass
	2) anticipated machinery specifications, including	See risk assessment report	Pass
	i) a description of the various phases of the whole life cycle of the machinery,	See risk assessment report	Pass
	ii) design drawings or other means of establishing the nature of the machinery, and	See risk assessment report	Pass
	iii) required energy sources and how they are supplied;	See risk assessment report	Pass
	3) documentation on previous designs of similar machinery, if relevant;	See risk assessment report	Pass
	4) Information for use of the machinery, as available.	See risk assessment report	Pass
	b) Related to regulations, standards and other applicable documents:	See risk assessment report	Pass
	1) applicable regulations;	See risk assessment report	Pass
	2) relevant standards;	See risk assessment report	Pass
	3) relevant technical specifications;	See risk assessment report	Pass
	4) Relevant safety data sheets.	See risk assessment report	Pass
	c) Related to experience of use:	See risk assessment report	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	1) any accident, incident or malfunction history of the actual or similar machinery;	Considered	Pass
	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;	Considered	Pass
	3) the experience of users of similar machines and, whenever practicable, an exchange of information with the potential users.	Considered	Pass
	NOTE An incident that has occurred and resulted in harm can be referred to as an "accident", whereas an incident that has occurred and that did not result in harm can be referred to as a "near miss" or "dangerous occurrence".	Noted	Pass
	d) Relevant ergonomic principles.	Considered	Pass
	The information shall be updated as the design develops or when modifications to the machine are required.	Considered	Pass
	Comparisons between similar hazardous situations associated with different types of machinery are often possible, provided that sufficient information about hazards and accident circumstances in those situations is available.	Considered	Pass
	NOTE The absence of an accident history, a small number of accidents or low severity of accidents ought not to be taken as a presumption of a low risk.	Noted	Pass
	For quantitative analysis, data from databases, handbooks, laboratories or manufacturers' specifications may be used, provided that there is confidence in the suitability of the data. Uncertainty associated with these data shall be indicated in the documentation (see Clause 7).	Considered	Pass
5.3	**Determination of limits of machinery**	-	-
5.3.1	**General** 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.	All the limits have been considered	Pass
5.3.2	**Use limits.** Use limits include the intended use and the reasonably foreseeable misuse. Aspects to be taken into account include the following:	Considered, see below	Pass
	a) the different machine operating modes and different intervention procedures for the users, including interventions required by malfunctions of the machine;	Considered	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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.);	Considered	Pass
	c) the anticipated levels of training, experience or ability of users including	Considered	Pass
	1) operators,	Considered	Pass
	2) maintenance personnel or technicians,	Considered	Pass
	3) trainees and apprentices, and	Considered	Pass
	4) the general public;	Not used for general public	N/A
	d) exposure of other persons to the hazards associated with the machinery where it can be reasonably foreseen:	Considered	Pass
	1) persons likely to have a good awareness of the specific hazards, such as operators of adjacent machinery;	Considered	Pass
	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;	Considered	Pass
	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.	Considered	Pass
	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).	The information has been stated in manual	N/A
5.3.3	**Space limits** Aspects of space limits to be taken into account include	Considered	Pass
	a) the range of movement,	Considered	Pass
	b) space requirements for persons interacting with the machine, such as during operation and maintenance,	The space has been considered during design, see installation diagram.	Pass
	c) human interaction such as the operator–machine interface, and	Considered, see operator position diagram	Pass
	d) the machine–power supply interface.	The position of power supply is according to EN 60204-1	Pass
5.3.4	**Time limits** Aspects of time limits to be taken into account include	Considered, see below	Pass
	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	The life limit has been stated in manual	Pass
	b) Recommended service intervals.	See manual	Pass
5.3.5	**Other limits** Examples of other limits include	See below	Pass
	a) properties of the material(s) to be processed,	For wood only, see manual.	Pass
	b) housekeeping — the level of cleanliness required, and	Considered	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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.	The information has been stated in manual.	Pass
5.4	**Hazard identification** 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.:	All the phases of the machine life cycle have been considered. See risk assessment report.	Pass
	□ transport, assembly and installation;	See above	Pass
	□ commissioning;	See above	Pass
	□ use;	See above	Pass
	□ dismantling, disabling and scrapping.	See above	Pass
	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.	Considered	Pass
	The designer shall identify hazards taking into account the following.	All the hazards have been taking into account	Pass
	a) Human interaction during the whole life cycle of the machine	Considered	Pass
	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:	All phases of the machine life cycle have been considered	Pass
	□ 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.	All the phases of this clause has been considered	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	All reasonably foreseeable hazards, hazardous situations or hazardous events associated with the various tasks shall then be identified. Annex B gives examples of hazards, hazardous situations and hazardous events to assist in this process. Several methods are available for the systematic identification of hazards. See also ISO/TR 14121-2.	All the hazards stated in annex B have been considered, and the risk assessment has been carried out according to ISO/TR 14121-2, in which the factors Se-CI(Fr, Pr, Av) and diagram are used to evaluate the level of risk.	Pass
	In addition, reasonably foreseeable hazards, hazardous situations or hazardous events not directly related to tasks shall be identified.	Considered	Pass
	EXAMPLE Seismic events, lightning, excessive snow loads, noise, break-up of machinery, hydraulic hose burst.	noted	Pass
	b) Possible states of the machine	The possible states of the machine have been considered.	Pass
	These are as follows:	See below	Pass
	1) the machine performs the intended function (the machine operates normally);	Considered	Pass
	2) the machine does not perform the intended function (i.e. it malfunctions) due to a variety of reasons, including	Considered	Pass
	□ variation of a property or of a dimension of the processed material or of the workpiece, □ failure of one or more of its component parts or services, □ external disturbances (for example, shocks, vibration, electromagnetic interference), □ design error or deficiency (for example, software errors), □ disturbance of its power supply, and □ surrounding conditions (for example, damaged floor surfaces).	Considered	Pass
	c) Unintended behaviour of the operator or reasonably foreseeable misuse of the machine	The reasonably foreseeable misuse has been stated in manual.	Pass
	Examples include	See below	Pass
	□ loss of control of the machine by the operator (especially for hand-held or mobile machines), □ reflex behaviour of a person in case of malfunction, incident or failure during the use of the machine, □ behaviour resulting from lack of concentration or carelessness, □ behaviour resulting from taking the “line of least resistance” in carrying out a task, □ behaviour resulting from pressures to keep the machine running in all circumstances, and □ behaviour of certain persons (for example, children, disabled persons).	All the hazards have been taken into account during design.	Pass
	NOTE Examination of the available design documentation can be a useful means of identifying hazards related to the machinery,	Noted	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	particularly those associated with moving elements such as motors or hydraulic cylinders.		
5.5	**Risk estimation**	-	-
5.5.1	**General**	-	-
	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.	Risk estimation has been carried out according to ISO 14121-2	Pass
	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 □ estimate the risk associated with the emissions, □ evaluate the effectiveness of the protective measures implemented at the design stage, □ provide potential buyers with quantitative information on emissions in the technical documentation, and □ provide users with quantitative information on emissions in the information for use. Hazards other than emissions that are described by measurable parameters can be dealt with in a similar manner.	Noise emission has been tested according to EN ISO 11202.	Pass
5.5.2	**Elements of risk**	-	-
5.5.2.1	**General**	-	-
	The risk associated with a particular hazardous situation depends on the following elements: a) the severity of harm; b) the probability of occurrence of that harm, which is a function of 1) the exposure of person(s) to the hazard, 2) the occurrence of a hazardous event, and 3) the technical and human possibilities to avoid or limit the harm. The elements of risk are shown in Figure 3. Additional details are given in 5.5.2.2, 5.5.2.3 and 5.5.3.	All the elements have been considered, see risk assessment report.	Pass
5.5.2.2	**Severity of harm**	-	-
	The severity can be estimated by taking into account the following:	Considered, see risk assessment report	Pass
	a) the severity of injuries or damage to health, for example, □ slight, □ serious, □ death.	See above	Pass
	b) the extent of harm, for example, to □ one person, □ several persons.	See above	Pass
	When carrying out a risk assessment, the risk from the most likely severity of the harm that is likely to occur from each identified hazard shall	This requirement has been taken into account during risk assessment.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	be considered, but the highest foreseeable severity shall also be taken into account, even if the probability of such an occurrence is not high.		
5.5.2.3	**Probability of occurrence of harm**	-	-
5.5.2.3.1	**Exposure of persons to the hazard**	-	-
	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,	Considered, see risk assessment report.	Pass
	a) the need for access to the hazard zone (for normal operation, correction of malfunction, maintenance or repair, etc.),	See above	Pass
	b) the nature of access (for example, manual feeding of materials),	See above	Pass
	c) the time spent in the hazard zone,	See above	Pass
	d) the number of persons requiring access, and	See above	Pass
	e) the frequency of access.	See above	Pass
5.5.2.3.2	**Occurrence of a hazardous event**	-	-
	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,	Considered, see risk assessment report.	Pass
	a) reliability and other statistical data,	See above	Pass
	b) accident history,	See above	Pass
	c) history of damage to health, and	See above	Pass
	d) comparison of risks (see 5.6.3).	See above	Pass
	NOTE The occurrence of a hazardous event can be of a technical or human origin.	Noted	Pass
5.5.2.3.3	**Possibility of avoiding or limiting harm**	-	-
	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:	Considered, see risk assessment report.	Pass
	a) different persons who can be exposed to the hazard(s), for example, □ skilled, □ unskilled;	See above	Pass
	b) how quickly the hazardous situation could lead to harm, for example, □ suddenly, □ quickly, □ slowly;	See above	Pass
	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;	See above	Pass
	d) the human ability to avoid or limit harm (for example, reflex, agility, possibility of escape);	See above	Pass
	e) practical experience and knowledge, for example,	See above	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	□ of the machinery, □ of similar machinery, □ no experience.		
5.5.3	**Aspects to be considered during risk estimation**	-	-
5.5.3.1	**Persons exposed**	-	-
	Risk estimation shall take into account all persons (operators and others) for whom exposure to the hazard is reasonably foreseeable.	Considered	Pass
5.5.3.2	**Type, frequency and duration of exposure**	-	-
	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.	All the situations have been taken into account	Pass
	The risk estimation shall also take into account tasks, for which it is necessary to suspend protective measures.	Considered	Pass
5.5.3.3	**Relationship between exposure and effects**	-	-
	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.	Considered	Pass
	NOTE 1 Accident data can assist in establishing the probability and severity of injury associated with the use of a particular type of machinery with a particular type of protective measure.	Noted	Pass
	NOTE 2 Zero accident data is, however, no guarantee of the low probability and severity of an injury.	Noted	Pass
5.5.3.4	**Human factors**	-	-
	Human factors can affect risk and shall be taken into account in the risk estimation, including, for example,	Considered	Pass
	a) the interaction of person(s) with the machinery, including correction of malfunction,	Considered	Pass
	b) interaction between persons,	Considered	Pass
	c) stress-related aspects,	Considered	Pass
	d) ergonomic aspects,	Considered	Pass
	e) the capacity of persons to be aware of risks in a given situation depending on their training, experience and ability,	Considered	Pass
	f) fatigue aspects, and	Considered	Pass
	g) aspects of limited abilities (due to disability,	Considered	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	age, etc.).		
	Training, experience and ability can affect risk; nevertheless, none of these factors shall be used as a substitute for hazard elimination, risk reduction by inherently safe design measure or safeguarding, wherever these protective measures can be practicably implemented.	Considered	Pass
5.5.3.5	**Suitability of protective measures**	-	-
	Risk estimation shall take into account the suitability of protective measures and shall	Considered, see risk assessment report	Pass
	a) identify the circumstances which can result in harm,	Identified	Pass
	b) whenever appropriate, be carried out using quantitative methods to compare alternative protective measures (see ISO/TR 14121-2), and	See risk assessment report	Pass
	c) provide information that can assist with the selection of appropriate protective measures.	Appropriate information has been provided.	Pass
	When estimating risk, those components and systems identified as immediately increasing the risk in case of failure need special attention.	Considered	Pass
	When protective measures include work organization, correct behaviour, attention, application of personal protective equipment (PPE), skill or training, the relatively low reliability of such measures compared with proven technical protective measures shall be taken into account in the risk estimation.	Considered	Pass
5.5.3.6	**Possibility of defeating or circumventing protective measures**	-	-
	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.	Assemble the safety components according to EN 1088.	Pass
	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,	Considered	Pass
	a) the protective measure slows down production or interferes with another activity or preference of the user,	No protective measure will slow down production or interferes with another activity	N/A
	b) the protective measure is difficult to use,	No this kind of situation	N/A
	c) persons other than the operator are involved, or	Considered	Pass
	d) the protective measure is not recognized by the user or not accepted as being suitable for its function.	No this kind of situation	N/A
	Whether or not a protective measure can be defeated depends on both the type of protective measure, such as an adjustable guard or	considered	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	programmable trip device, and its design details.		
	Protective measures that use programmable electronic systems introduce additional possibilities of defeat or circumvention if access to safety-related software is not appropriately restricted by design and monitoring methods. Risk estimation shall identify where safety-related functions are not separated from other machine functions and shall determine the extent to which access is possible. This is particularly important when remote access for diagnostic or process correction purposes is required.	Not use programmable electronic system as Protective measure.	N/A
5.5.3.7	**Ability to maintain protective measures**	-	-
	Risk estimation shall consider whether the protective measures can be maintained in the condition necessary to provide the required level of protection.	Considered	Pass
	NOTE If the protective measure cannot easily be maintained in correct working order, this can encourage the defeat or circumvention of the protective measure in order to allow continued use of the machinery.	Noted	Pass
5.5.3.8	**Information for use**	-	-
	Risk estimation shall take into account the information for use, as available. See also 6.4.	Appropriate information has been provided, see manual.	Pass
5.6	**Risk evaluation**	-	-
5.6.1	**General**	-	-
	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.	Comply with the requirement, see risk assessment report.	Pass
	Achieving the objectives of risk reduction and a favourable outcome of risk comparison applied when practicable gives confidence that risk has been adequately reduced.	The risk has been reduced to acceptable level after correction	Pass
5.6.2	**Adequate risk reduction**	-	-
	Application of the three-step method described in 6.1 is essential in achieving adequate risk reduction.	applied	Pass
	Following the application of the three-step method, adequate risk reduction is achieved	Comply with the requirement.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	when □ all operating conditions and all intervention procedures have been considered, □ the hazards have been eliminated or risks reduced to the lowest practicable level, □ any new hazards introduced by the protective measures have been properly addressed, □ users are sufficiently informed and warned about the residual risks (see 6.1, step 3), □ protective measures are compatible with one another, □ sufficient consideration has been given to the consequences that can arise from the use in a non-professional/non-industrial context of a machine designed for professional/industrial use, and □ the protective measures do not adversely affect the operator's working conditions or the usability of the machine.		
5.6.3	**Comparison of risks**	-	-
	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:	No similar machine used to comparison of this machine.	N/A
	□ the similar machinery is in accordance with the relevant type-C standard(s);	See above	N/A
	□ the intended use, reasonably foreseeable misuse and the way both machines are designed and constructed are comparable;	See above	N/A
	□ the hazards and the elements of risk are comparable;	See above	N/A
	□ the technical specifications are comparable;	See above	N/A
	□ the conditions for use are comparable.	See above	N/A
	The use of this comparison method does not eliminate the need to follow the risk assessment process as described in this International Standard for the specific conditions of use. For example, when a band saw used for cutting meat is compared with a band saw used for cutting wood, the risks associated with the different material shall be assessed.	See above	N/A
6	**Risk reduction**	-	-
6.1	**General**	-	-
	The objective of risk reduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk:	Considered, see risk assessment report	Pass
	□ severity of harm from the hazard under consideration;	See above	Pass
	□ probability of occurrence of that harm.	See above	Pass
	All protective measures intended for reaching this objective shall be applied in the following sequence, referred to as the three-step method	Protective measures have been used according to three-step method.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	(see also Figures 1 and 2).		
	Step 1: Inherently safe design measures	considered	Pass
	Inherently safe design measures eliminate hazards or reduce the associated risks by a suitable choice of design features of the machine itself and/or interaction between the exposed persons and the machine. See 6.2.	considered	Pass
	NOTE 1 This stage is the only one at which hazards can be eliminated, thus avoiding the need for additional protective measures such as safeguarding or complementary protective measures.	noted	Pass
	Step 2: Safeguarding and/or complementary protective measures	considered	Pass
	Taking into account the intended use and the reasonably foreseeable misuse, appropriately selected safeguarding and complementary protective measures can be used to reduce risk when it is not practicable to eliminate a hazard, or reduce its associated risk sufficiently, using inherently safe design measures. See 6.3.	Appropriate guarding have been provided	Pass
	Step 3: Information for use	considered	Pass
	Where risks remain despite inherently safe design measures, safeguarding and the adoption of complementary protective measures, the residual risks shall be identified in the information for use. The information for use shall include, but not be limited to, the following:	Appropriate information has been provided.	Pass
	□ operating procedures for the use of the machinery consistent with the expected ability of personnel who use the machinery or other persons who can be exposed to the hazards associated with the machinery;	See manual	Pass
	□ the recommended safe working practices for the use of the machinery and the related training requirements adequately described;	See manual	Pass
	□ sufficient information, including warning of residual risks for the different phases of the life of the machinery;	See manual and warning label	Pass
	□ the description of any recommended personal protective equipment, including detail as to its need as well as to training needed for its use.	See manual	Pass
	Information for use shall not be a substitute for the correct application of inherently safe design measures, safeguarding or complementary protective measures.	See manual	Pass
	NOTE 2 Adequate protective measures associated with each of the operating modes and intervention procedures reduce the	noted	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	possibility of operators being induced to use hazardous intervention techniques in case of technical difficulties.		
6.2	**Inherently safe design measures**	-	-
6.2.1	**General**	-	-
	Inherently safe design measures are the first and most important step in the risk reduction process. This is because protective measures inherent to the characteristics of the machine are likely to remain effective, whereas experience has shown that even well-designed safeguarding can fail or be violated and information for use may not be followed.	Inherently safe design has been considered first	Pass
	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.	considered	Pass
	NOTE See 6.3 for safeguarding and complementary measures that can be used to achieve the risk reduction objectives in the case where inherently safe design measures are not sufficient (see 6.1 for the three-step method).	Considered	Pass
6.2.2	**Consideration of geometrical factors and physical aspects**	-	-
6.2.2.1	**Geometrical factors**	-	-
	Such factors include the following.	See below	Pass
	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:	The working area can be seen from the control position	Pass
	□ the travelling and working area of mobile machines;	Not mobile machine	N/A
	□ the zone of movement of lifted loads or of the carrier of machinery for lifting persons;	Not this kind of machine	N/A
	□ the area of contact of the tool of a hand-held or hand-guided machine with the material being worked.	Not this kind of machine	N/A
	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.	This requirement has been considered during design.	Pass
	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	Safety distance has been considered according to ISO 13857.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	by reducing the gap so that no part of the body can enter it (see ISO 13854 and ISO 13857).		
	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.	All edges and corners have been rounded. No trap hazard is found on this machine.	Pass
	d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).	This requirement has been considered during design.	Pass
6.2.2.2	**Physical aspects**	-	-
	Such aspects include the following:	See below	Pass
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;	This requirement has been considered during design.	Pass
	b) limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;	This requirement has been considered during design.	Pass
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing	This requirement has been considered during design.	Pass
	1) noise emission at source (see ISO/TR 11688-1),	This requirement has been considered during design.	Pass
	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)],	This requirement has been considered during design.	Pass
	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	This requirement has been considered during design.	Pass
	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)].	No this kind of risk	N/A
6.2.3	**Taking into account general technical knowledge of machine design**	-	-
	This general technical knowledge can be derived from technical specifications for design (standards, design codes, calculation rules, etc.), which should be used to cover	This requirement has been considered during design.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	a) mechanical stresses such as	See below	Pass
	□ stress limitation by implementation of correct calculation, construction and fastening methods as regards, for example, bolted assemblies and welded assemblies,	This requirement has been considered during design.	Pass
	□ stress limitation by overload prevention (bursting disk, pressure-limiting valves, breakage points, torque-limiting devices, etc.),	This requirement has been considered during design.	Pass
	□ avoiding fatigue in elements under variable stresses (notably cyclic stresses), and	This requirement has been considered during design.	Pass
	□ static and dynamic balancing of rotating elements,	This requirement has been considered during design.	Pass
	b) materials and their properties such as	See below	Pass
	□ resistance to corrosion, ageing, abrasion and wear,	Considered	Pass
	□ hardness, ductility, brittleness,		Pass
	□ homogeneity,	Considered	Pass
	□ toxicity, and	Considered	Pass
	□ flammability, and	Considered	Pass
	c) emission values for	See below	Pass
	□ noise,	The noise is less than 80dB	Pass
	□ vibration,	considered	Pass
	□ hazardous substances, and	No this kind of risk	Pass
	□ radiation.	No this kind of risk	Pass
	When the reliability of particular components or assemblies is critical for safety (for example, ropes, chains, lifting accessories for lifting loads or persons), stress limits shall be multiplied by appropriate working coefficients.	No this kind of risk	N/A
6.2.4	**Choice of appropriate technology**	Considered	Pass
	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:	See below	Pass
	a) on machines intended for use in explosive atmospheres, using	Not used in explosive atmospheres	N/A
	□ appropriately selected pneumatic or hydraulic control system and machine actuators,	See above	N/A
	□ intrinsically safe electrical equipment (see IEC 60079-11);	See above	N/A
	b) for particular products to be processed (for example, by a solvent), by using equipment that ensures the temperature will remain far below the flash point;	No this kind of risk	N/A
	c) the use of alternative equipment to avoid high noise levels, such as	Considered	Pass
	□ electrical instead of pneumatic equipment,	pneumatic equipment used	Pass
	□ in certain conditions, water-cutting instead of mechanical equipment.	Not applicable	N/A
6.2.5	**Applying principle of positive mechanical action**	-	-
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements. An	Not applicable	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	example of this is positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119).		
	NOTE Where a mechanical component moves and thus allows a second component to move freely (for example, by gravity or spring force), there is no positive mechanical action of the first component on the second.	noted	Pass
6.2.6	**Provisions for stability.**	-	-
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use. Factors to be taken into account include	This requirement has been considered during design.	Pass
	□ the geometry of the base,	Considered	Pass
	□ the weight distribution, including loading,	Considered	Pass
	□ 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,	Considered	Pass
	□ vibration,	Considered	Pass
	□ oscillations of the centre of gravity,	Considered	Pass
	□ characteristics of the supporting surface in case of travelling or installation on different sites (ground conditions, slope, etc.), and	Considered	Pass
	□ external forces, such as wind pressure and manual forces.	manual force has been considered	Pass
	Stability shall be considered in all phases of the life cycle of the machine, including handling, travelling, installation, use, dismantling, disabling and scrapping.	Considered	Pass
	Other protective measures for stability relevant to safeguarding are given in 6.3.2.6.	Considered	Pass
6.2.7	**Provisions for maintainability**	-	-
	When designing a machine, the following maintainability factors shall be taken into account to enable maintenance of the machine:	This requirement has been considered during design.	Pass
	□ accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used;	Considered	Pass
	□ ease of handling, taking into account human capabilities;	Considered	Pass
	□ limitation of the number of special tools and equipment.	Considered	Pass
6.2.8	**Observing ergonomic principles**	-	-
	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.	This requirement has been considered during design.	Pass
	NOTE Also improved are the performance and reliability of operation and hence the reduction	noted	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	in the probability of errors at all stages of machine use.		
	Account shall be taken of body sizes likely to be found in the intended user population, strengths and postures, movement amplitudes, frequency of cyclic actions (see ISO 10075 and ISO 10075-2).		
	All elements of the operator–machine interface, such as controls, signalling or data display elements, shall be designed to be easily understood so that clear and unambiguous interaction between the operator and the machine is possible. See EN 614-1, EN 13861 and IEC 61310-1.	Considered	Pass
	The designer's attention is particularly drawn to following ergonomic aspects of machine design.	Considered	Pass
	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).	Considered	Pass
	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.	Considered	Pass
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatures.	Considered	Pass
	d) Avoid linking the operator's working rhythm to an automatic succession of cycles.	Considered	Pass
	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.	No need	N/A
	f) Select, locate and identify manual controls (actuators) so that	Considered	Pass
	□ they are clearly visible and identifiable, and appropriately marked where necessary (see 6.4.4),	This requirement has been considered during design.	Pass
	□ 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),	This requirement has been considered during design.	Pass
	□ their location (for push-buttons) and their movement (for levers and hand wheels) are consistent with their effect (see IEC 61310-3), and	According to IEC 61310-3	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	□ their operation cannot cause additional risk. See also ISO 9355-3.	No additional risk is found.	Pass
	Where a control is designed and constructed to perform several different actions — namely, where there is no one-to-one correspondence (for example, keyboards) — the action to be performed shall be clearly displayed and subject to confirmation where necessary.	Marked with words.	Pass
	Controls shall be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Constraints due to the necessary or foreseeable use of personal protective equipment (such as footwear, gloves) shall be taken into account.	This requirement has been considered during design.	Pass
	g) Select, design and locate indicators, dials and visual display units so that	See below	Pass
	□ they fit within the parameters and characteristics of human perception,	Considered	Pass
	□ 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	Considered	Pass
	□ the operator is able to perceive them from the control position.	Considered	Pass
6.2.9	**Electrical hazards**	-	-
	For the design of the electrical equipment of machines, IEC 60204-1 gives general provisions about disconnection and switching of electrical circuits and for protection against electric shock. For requirements related to specific machines, see corresponding IEC standards (for example, IEC 61029, IEC 60745 or IEC 60335).	See EN 60204-1 report	Pass
6.2.10	**Pneumatic and hydraulic hazards**	-	-
	Pneumatic and hydraulic equipment of machinery shall be designed so that	Pneumatic equipment has been used, See below	Pass
	□ the maximum rated pressure cannot be exceeded in the circuits (using, for example, pressure-limiting devices),	By user	Pass
	□ no hazard results from pressure fluctuations or increases, or from loss of pressure or vacuum,	No this kind of risk	Pass
	□ no hazardous fluid jet or sudden hazardous movement of the hose (whiplash) results from leakage or component failures,	No this kind of risk	Pass
	□ 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,	Not used	N/A
	□ all elements of the equipment, especially pipes and hoses, are protected against harmful external effects,	protected	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	□ 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	No this kind of equipment used on this machine.	N/A
	□ all elements which remain under pressure after isolation of the machine from its power supply are provided with clearly identified exhaust devices, and there is a warning label drawing attention to the necessity of depressurizing those elements before any setting or maintenance activity on the machine.	No this kind of situation	N/A
	NOTE See also ISO 4413 and ISO 4414.	Noted	N/A
6.2.11	**Applying inherently safe design measures to control systems**	-	-
6.2.11.1	**General**	-	-
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061).	No this kind of situation	N/A
	The correct design of machine control systems can avoid unforeseen and potentially hazardous machine behaviour.	This requirement has been considered during design.	Pass
	Typical causes of hazardous machine behaviour are	See below	Pass
	□ an unsuitable design or modification (accidental or deliberate) of the control system logic,	considered	Pass
	□ a temporary or permanent defect or failure of one or several components of the control system,	No need according to risk assessment	N/A
	□ a variation or a failure in the power supply of the control system, and	considered	Pass
	□ inappropriate selection, design and location of the control devices.	considered	Pass
	Typical examples of hazardous machine behaviour are	See below	Pass
	□ unexpected start-up (see ISO 14118),	Comply with ISO14118	Pass
	□ uncontrolled speed change,	No this kind of risk	N/A
	□ failure to stop moving parts,	No this kind of risk.	Pass
	□ dropping or ejection of part of the machine or of a workpiece clamped by the machine, and	Considered	Pass
	□ machine action resulting from inhibition (defeating or failure) of protective devices.	Considered	Pass
	In order to prevent hazardous machine behaviour and to achieve safety functions, the design of control systems shall comply with the principles and methods presented in this subclause (6.2.11) and in 6.2.12. These principles and methods shall be applied singly or in combination as appropriate to the circumstances	The design of control systems shall comply with the principles and methods presented in 6.2.11 and in 6.2.12	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	(see ISO 13849-1, IEC 60204-1 and IEC 62061).		
	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:	Considered.	Pass
	□ systematic analysis of start and stop conditions;	Analysis has been carried out by designer.	Pass
	□ 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);	Considered, see EN 60204-1 report for detail	Pass
	□ clear display of the faults;	No need.	N/A
	□ 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);	Design according to ISO 14118:2000, Figure 1.	Pass
	□ maintained stop commands (for example, interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000, Figure 1).	Design according to ISO 14118:2000, Figure 1.	Pass
	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.	Just one emergency stop is provided.	N/A
	Control systems shall be designed to limit the movements of parts of the machinery, the machine itself, or workpieces and/or loads held by the machinery, to the safe design parameters (for example, range, speed, acceleration, deceleration, load capacity). Allowance shall be made for dynamic effects (swinging of loads, etc.).	Design according to ISO 14118:2000, Figure 1.	Pass
	For example:	-	-
	□ the travelling speed of mobile pedestrian controlled machinery other than remote-controlled shall be compatible with walking speed;	No this kind of situation	N/A
	□ the range, speed, acceleration and deceleration of movements of the person-carrier and carrying vehicle for lifting persons shall be limited to non-hazardous values, taking into	No this kind of situation	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	account the total reaction time of the operator and the machine;		
	□ the range of movements of parts of machinery for lifting loads shall be kept within specified limits.	No this kind of situation	N/A
	When the machinery contains various elements that can be operated independently, the control system shall be designed to prevent risks arising out of a lack of coordination (for example, collision prevention system).	This requirement has been taken into account during design.	Pass
6.2.11.2	**Starting of an internal power source/switching on an external power supply**	-	-
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.	No hazardous situation is found	Pass
	For example:	See below	Pass
	□ starting the internal combustion engine shall not lead to movement of a mobile machine;	No internal combustion engine used	N/A
	□ connection to mains electricity supply shall not result in the starting of working parts of a machine.	Start the machine shall actuate the start button	Pass
	See IEC 60204-1:2005, 7.5 (see also Annexes A and B).	See EN 60204-1 report	Pass
6.2.11.3	**Starting/stopping of a mechanism**	-	-
	The primary action for starting or accelerating the movement of a mechanism should be performed by the application or an increase of voltage or fluid pressure, or — if binary logic elements are considered — by passage from state 0 to state 1 (where state 1 represents the highest energy state).	By increase of voltage.	Pass
	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).	By removal the voltage	Pass
	In certain applications, such as high-voltage switchgear, this principle cannot be followed, in which case other measures should be applied to achieve the same level of confidence for the stopping or slowing down.	No this kind of situation	N/A
	When, in order for the operator to maintain permanent control of deceleration, this principle is not observed (for example, a hydraulic braking device of a self-propelled mobile machine), the machine shall be equipped with a means of slowing and stopping in case of failure of the main braking system.	No this kind of risk	N/A
6.2.11.4	**Restart after power interruption**	-	-
	If a hazard could be generated, the spontaneous restart of a machine when it is	Restart the machine shall re-actuate the start manual	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	re-energized after power interruption shall be prevented (for example, by use of a self-maintained relay, contactor or valve).		
6.2.11.5	Interruption of power supply	-	-
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply. At least the following requirements shall be met:	See below	Pass
	□ the stopping function of the machinery shall remain;	Comply with the requirement	Pass
	□ 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);	Comply with the requirement	Pass
	□ 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.	Comply with the requirement	Pass
6.2.11.6	**Use of automatic monitoring**	-	-
	Automatic monitoring is intended to ensure that a safety function or functions implemented by a protective measure do not fail to be performed if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed such that hazards are generated.	No need.	N/A
	Automatic monitoring either detects a fault immediately or carries out periodic checks so that a fault is detected before the next demand upon the safety function. In either case, the protective measure can be initiated immediately or delayed until a specific event occurs (for example, the beginning of the machine cycle).	No need.	N/A
	The protective measure may be, for example,	See above	N/A
	□ the stopping of the hazardous process,	See above	N/A
	□ preventing the restart of this process after the first stop following the failure, or	See above	N/A
	□ the triggering of an alarm.	See above	N/A
6.2.11.7	**Safety functions implemented by programmable electronic control systems**	No safety function implemented by programmable electronic control system	N/A
6.2.11.7.1	**General**	See above	N/A
	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		

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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).		
	NOTE Both ISO 13849-1 and IEC 62061, specific to machinery safety, provide guidance applicable to programmable electronic control systems.	See above	N/A
	The programmable electronic control system should be installed and validated to ensure that the specified performance [for example, safety integrity level (SIL) in IEC 61508] for each safety function has been achieved. Validation comprises testing and analysis (for example, static, dynamic or failure analysis) to show that all parts interact correctly to perform the safety function and that unintended functions do not occur.	See above	N/A
6.2.11.7.2	**Hardware aspects**	See above	N/A
	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	See above	N/A
	□ architectural constraints (the configuration of the system, its ability to tolerate faults, its behaviour on detection of a fault, etc.),	See above	N/A
	□ selection, and/or design, of equipment and devices with an appropriate probability of dangerous random hardware failure, and	See above	N/A
	□ the incorporation of measures and techniques within the hardware so as to avoid systematic failures and control systematic faults.		
6.2.11.7.3	**Software aspects**	See above	N/A
	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).	See above	N/A
	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)].	See above	N/A
	When the application requires reprogramming by the user, the access to the software dealing with safety functions should be restricted (for example, by locks or passwords for the	See above	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	authorized persons).		
6.2.11.8	**Principles relating to manual control**	-	-
	These are as follows.	See below	Pass
	a) Manual control devices shall be designed and located according to the relevant ergonomic principles given in 6.2.8, item f).	See related clause	Pass
	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.	Stop control device is placed near each start control device	Pass
	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.	All manual controls are located out of reach of the danger zone.	Pass
	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.	Operator can observe the working area from the control position	Pass
	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.	Not this kind of machine.	N/A
	2) On machinery intended for lifting persons, controls for lifting and lowering and, if appropriate, for moving the carrier shall generally be located in the carrier. If safe operation requires controls to be situated outside the carrier, the operator in the carrier shall be provided with the means of preventing hazardous movements.	Not this kind of machine.	N/A
	e) If it is possible to start the same hazardous element by means of several controls, the control circuit shall be so arranged that only one control is effective at a given time. This applies especially to machines which can be manually controlled by means of, among others, a portable control unit (such as a teach pendant), with which the operator can enter danger zones.	no this kind of situation	N/A
	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).	All the hazards have been guarded.	Pass
	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).	Not depends on operator.	N/A
	h) For cableless control, an automatic stop shall be performed when correct control signals are	No cableless control used	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	not received, including loss of communication (see IEC 60204-1).		
6.2.11.9	**Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance**	-	-
	Where, for setting, teaching, process changeover, fault-finding, cleaning or maintenance of machinery, a guard has to be displaced or removed and/or a protective device has to be disabled, and where it is necessary for the purpose of these operations for the machinery or part of the machinery to be put into operation, the safety of the operator shall be achieved using a specific control mode which simultaneously	For this kind of mode, the power to machine shall cut off or no need displaced safety protective device.	N/A
	a) disables all other control modes,	See above	N/A
	b) permits operation of the hazardous elements only by continuous actuation of an enabling device, a two-hand control device or a hold-to-run control device,	See above	N/A
	c) permits operation of the hazardous elements only in reduced risk conditions (for example, reduced speed, reduced power/force, step-by-step, for example, with a limited movement control device), and	See above	N/A
	d) prevents any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.	See above	N/A
	NOTE For some special machinery other protective measures can be appropriate.	noted	N/A
	This control mode shall be associated with one or more of the following measures:	See above	N/A
	□ restriction of access to the danger zone as far as possible;	See above	N/A
	□ emergency stop control within immediate reach of the operator;	See above	N/A
	□ portable control unit (teach pendant) and/or local controls (allowing sight of the controlled elements).	See above	N/A
	See IEC 60204-1.	See above	N/A
6.2.11.10	**Selection of control and operating modes**	-	-
	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.	Key switch provided for setting use.	Pass
	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	No this kind of function.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	codes for certain numerically controlled functions).		
6.2.11.11	**Applying measures to achieve electromagnetic compatibility (EMC)**	Covered by EMC directive	N/A
	For guidance on electromagnetic compatibility, see IEC 60204-1 and IEC 61000-6.	Covered by EMC directive	N/A
6.2.11.12	**Provision of diagnostic systems to aid fault-finding**	-	-
	Diagnostic systems to aid fault-finding should be included in the control system so that there is no need to disable any protective measure.	No need to disable any protective measure	Pass
	NOTE Such systems not only improve availability and maintainability of machinery, they also reduce the exposure of maintenance staff to hazards.	noted	Pass
6.2.12	**Minimizing probability of failure of safety functions**	-	-
6.2.12.1	**General**	-	-
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine.	considered	Pass
	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.	See related clause.	Pass
6.2.12.2	**Use of reliable components**	-	-
	“Reliable components” means components which are capable of withstanding all disturbances and stresses associated with the usage of the equipment in the conditions of intended use (including the environmental conditions), for the period of time or the number of operations fixed for the use, with a low probability of failures generating a hazardous malfunctioning of the machine. Components shall be selected taking into account all factors mentioned above (see also 6.2.13).	All safety function component has Passed CE	Pass
	NOTE 1 “Reliable components” is not a synonym for “well-tried components” (see ISO 13849-1:2006, 6.2.4).	noted	Pass
	NOTE 2 Environmental conditions for consideration include impact, vibration, cold, heat, moisture, dust, corrosive and/or abrasive substances, static electricity and magnetic and electric fields. Disturbances which can be generated by those conditions include insulation failures and temporary or permanent failures in the function of control system components.	noted	Pass
6.2.12.3	**Use of “oriented failure mode” components**	-	-
	“Oriented failure mode” components or systems are those in which the predominant failure mode is known in advance and which can be used so that the effect of such a failure on the machine function can be predicted.	No need according to risk assessment	N/A
	NOTE In some cases, it will be necessary to	noted	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	take additional measures to limit the negative effects of such a failure.		
	The use of such components should always be considered, particularly in cases where redundancy (see 6.2.12.4) is not employed.	noted	N/A
6.2.12.4	**Duplication (or redundancy) of components or subsystems**	-	-
	In the design of safety-related parts of the machine, duplication (or redundancy) of components may be used so that, if one component fails, another component or components continue to perform the respective function(s), thereby ensuring that the safety function remains available.	No need.	N/A
	In order to allow the proper action to be initiated, component failure shall be detected by automatic monitoring (see 6.2.11.6) or in some circumstances by regular inspection, provided that the inspection interval is shorter than the expected lifetime of the components.	No need.	N/A
	Diversity of design and/or technology can be used to avoid common cause failures (for example, from electromagnetic disturbance) or common mode failures.	No need.	N/A
6.2.13	**Limiting exposure to hazards through reliability of equipment**	-	-
	Increased reliability of all component parts of machinery reduces the frequency of incidents requiring intervention, thereby reducing exposure to hazards.	Considered	Pass
	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.	Applied	Pass
	Safety-related components (for example, certain sensors) of known reliability shall be used.	Applied	Pass
	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.	Comply with the requirement	Pass
6.2.14	**Limiting exposure to hazards through mechanization or automation of loading (feeding)/ unloading (removal) operations**	--	-
	Mechanization and automation of machine loading/unloading operations and, more generally, of handling operations — of workpieces, materials or substances — limits the risk generated by these operations by reducing the exposure of persons to hazards at the operating points.	Loading and unloading manually	N/A
	Automation can be achieved by, for example, robots, handling devices, transfer mechanisms	See above	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	and air-blast equipment. Mechanization can be achieved by, for example, feeding slides, push-rods and hand-operated indexing tables.		
	While automatic feeding and removal devices have much to offer in preventing accidents to machine operators, they can create danger when any faults are being corrected. Care shall be taken to ensure that the use of these devices does not introduce further hazards, such as trapping or crushing, between the devices and parts of the machine or workpieces/materials being processed. Suitable safeguards (see 6.3) shall be provided if this cannot be ensured.	See above	N/A
	Automatic feeding and removal devices with their own control systems and the control system of the associated machine shall be interconnected after thorough study of how all safety functions are performed in all the control and operation modes of the entire equipment.	See above	N/A
6.2.15	**Limiting exposure to hazards through location of setting and maintenance points outside danger zones**	No need according to risk assessment	N/A
	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.	See above	N/A
6.3	**Safeguarding and complementary protective measures**	-	-
6.3.1	**General**	-	-
	Guards and protective devices shall be used to protect persons whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (for example, emergency stop equipment) may have to be implemented.	Fixed guards are provided.	Pass
	NOTE The different kinds of guards and protective devices are defined in 3.27 and 3.28.	noted	Pass
	Certain safeguards may be used to avoid exposure to more than one hazard.	Fixed guards are provided.	Pass
6.3.2	**Selection and implementation of guards and protective devices**	-	-
6.3.2.1	**General**	-	-
	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).	The guards have been selected according to the subclause.	Pass
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine.	See risk assessment report.	Pass
	In selecting an appropriate safeguard for a particular type of machinery or hazard zone, it	Fixed guards are used.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	shall be borne in mind that a fixed guard is simple and shall be used where the access of an operator into a danger zone is not required during the normal operation (operation without malfunction) of the machinery.		
	As the need for frequency of access increases, this inevitably leads to the fixed guard not being replaced. This requires the use of an alternative protective measure (movable interlocking guard, sensitive protective equipment).	No this kind of situation	N/A
	A combination of safeguards can sometimes be required. For example, where, in conjunction with a fixed guard, a mechanical loading (feeding) device is used to feed a workpiece into a machine, thereby removing the need for access to the primary hazard zone, a trip device can be required to protect against the secondary drawing-in or shearing hazard between the mechanical loading (feeding) device, when reachable, and the fixed guard.	No this kind of situation	N/A
	Consideration shall be given to the enclosure of control positions or intervention zones to provide combined protection against several hazards including	No this kind of hazard	N/A
	a) hazards from falling or ejected objects, using, for example, protection in the form of a falling object protection structure (FOPS),	No this kind of hazard	N/A
	b) emission hazards (protection against noise, vibration, radiation, substances hazardous to health, etc.),	No this kind of hazard	N/A
	c) hazards due to the environment (protection against heat, cold, foul weather, etc.),	No this kind of hazard	N/A
	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).	No this kind of hazard	N/A
	The design of enclosed work stations, such as cabs and cabins, shall take into account ergonomic principles concerning visibility, lighting, atmospheric conditions, access, posture.	No enclosed work station provided on this machine.	N/A
6.3.2.2	**Where access to the hazard zone is not required during normal operation**	-	-
	Where access to the hazard zone is not required during normal operation of the machinery, safeguards should be selected from the following:	See below	Pass
	a) fixed guards (see also ISO 14120);	Fixed guards are provided.	Pass
	b) interlocking guards with or without guard locking (see also 6.3.3.2.3, ISO 14119 and ISO 14120);	No this kind of situation	N/A
	c) self-closing guards (see ISO 14120:2002, 3.3.2);	No this kind of guard used	N/A
	d) sensitive protective equipment, such as electrosensitive protective equipment (see IEC	Not used	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	61496) or pressure-sensitive protective devices (see ISO 13856).		
6.3.2.3	**Where access to the hazard zone is required during normal operation**	-	-
	Where access to the hazard zone is required during normal operation of the machinery, safeguards should be selected from the following:	No this kind of situation	N/A
	a) interlocking guards with or without guard locking (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this document);	Not used.	N/A
	b) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496);	Not used.	N/A
	c) adjustable guards;	Not used.	N/A
	d) self-closing guards (see ISO 14120:2002, 3.3.2);	Not used.	N/A
	e) two-hand control devices (see ISO 13851);	Not used.	N/A
	f) interlocking guards with a start function (control guard) (see 6.3.3.2.5).	Not used.	N/A
6.3.2.4	**Where access to the hazard zone is required for machine setting, teaching, process changeover, fault-finding, cleaning or maintenance**	-	-
	As far as possible, machines shall be designed so that the safeguards provided for the protection of the production operator also ensure the protection of personnel carrying out setting, teaching, process changeover, fault-finding, cleaning or maintenance, without hindering them in the performance of their task. Such tasks shall be identified and considered in the risk assessment as parts of the use of the machine (see 5.2).	No this kind of situation	N/A
	NOTE Isolation and energy dissipation for machine shut-down (see 6.3.5.4, and also ISO 14118:2000, 4.1 and Clause 5) ensure the highest level of safety when carrying out tasks (especially maintenance and repair tasks) that do not require the machine to remain connected to its power supply.	No this kind of situation	N/A
6.3.2.5	**Selection and implementation of sensitive protective equipment**	-	-
6.3.2.5.1	**Selection**	-	-
	Due to the great diversity of the technologies on which their detection function is based, all types of sensitive protective equipment are far from being equally suitable for safety applications. The following provisions are intended to provide the designer with criteria for selecting, for each application, the most suitable device(s).	No sensitive protective equipment used on this machine.	N/A
	Types of sensitive protective equipment include	No sensitive protective equipment used on this machine.	N/A
	□ light curtains,	No sensitive protective	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
		equipment used on this machine.	
	□ scanning devices, for example, laser scanners,	No sensitive protective equipment used on this machine.	N/A
	□ pressure-sensitive mats, and	No sensitive protective equipment used on this machine.	N/A
	□ trip bars, trip wires.	No sensitive protective equipment used on this machine.	N/A
	Sensitive protective equipment can be used	No sensitive protective equipment used on this machine.	N/A
	□ for tripping purposes,	No sensitive protective equipment used on this machine.	N/A
	□ for presence sensing,	No sensitive protective equipment used on this machine.	N/A
	□ for both tripping and presence sensing, or	No sensitive protective equipment used on this machine.	N/A
	□ to re-initiate machine operation — a practice subject to stringent conditions.	No sensitive protective equipment used on this machine.	N/A
	NOTE Some types of sensitive protective equipment can be unsuitable either for presence sensing or for tripping purposes.	No sensitive protective equipment used on this machine.	N/A
	The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:	No sensitive protective equipment used on this machine.	N/A
	□ tendency for the machinery to eject materials or component parts;	No sensitive protective equipment used on this machine.	N/A
	□ necessity to guard against emissions (noise, radiation, dust, etc.);	No sensitive protective equipment used on this machine.	N/A
	□ erratic or excessive machine stopping time;	No sensitive protective equipment used on this machine.	N/A
	□ inability of a machine to stop part-way through a cycle.	No sensitive protective equipment used on this machine.	N/A
6.3.2.5.2	**Implementation**	-	-
	Consideration should be given to	-	-
	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),	No sensitive protective equipment used on this machine.	N/A
	b) the reaction of the device to fault conditions (see IEC 61496 for electrosensitive protective equipment),	No sensitive protective equipment used on this machine.	N/A
	c) the possibility of circumvention, and	No sensitive protective equipment used on this	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
		machine.	
	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).	No sensitive protective equipment used on this machine.	N/A
	NOTE 1 IEC 61496 defines the detection capability of electrosensitive protective equipment.	No sensitive protective equipment used on this machine.	N/A
	Sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that	No sensitive protective equipment used on this machine.	N/A
	□ a command is given as soon as a person or part of a person is detected,	No sensitive protective equipment used on this machine.	N/A
	□ the withdrawal of the person or part of a person detected does not, by itself, restart the hazardous machine function(s), and therefore the command given by the sensitive protective equipment is maintained by the control system until a new command is given,	No sensitive protective equipment used on this machine.	N/A
	□ restarting the hazardous machine function(s) results from the voluntary actuation by the operator of a control device placed outside the hazard zone, where this zone can be observed by the operator,	No sensitive protective equipment used on this machine.	N/A
	□ the machine cannot operate during interruption of the detection function of the sensitive protective equipment, except during muting phases, and	No sensitive protective equipment used on this machine.	N/A
	□ the position and the shape of the detection field prevents, possibly together with fixed guards, a person or part of a person from entering or being present in the hazard zone without being detected.	No sensitive protective equipment used on this machine.	N/A
	NOTE 2 Muting is the temporary automatic suspension of a safety function(s) by safety-related parts of the control system (see ISO 13849-1).	No sensitive protective equipment used on this machine.	N/A
	For detailed consideration of the fault behaviour of, for example, active optoelectronic protective devices, IEC 61496 should be taken into account.	No sensitive protective equipment used on this machine.	N/A
6.3.2.5.3	**Additional requirements for sensitive protective equipment when used for cycle initiation**	-	-
	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	No sensitive protective equipment used on this machine.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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.		
	Cycle initiation by sensitive protective equipment shall be subject to the following conditions:	No sensitive protective equipment used on this machine.	N/A
	a) only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used;	No sensitive protective equipment used on this machine.	N/A
	b) the requirements for an AOPD used as a tripping and presence-sensing device (see IEC 61496) are satisfied — in particular, location, minimum distance (see ISO 13855), detection capability, reliability andmonitoring of control and braking systems;	No sensitive protective equipment used on this machine.	N/A
	c) the cycle time of the machine is short and the facility to re-initiate the machine upon clearing of the sensing field is limited to a period commensurate with a single normal cycle;	No sensitive protective equipment used on this machine.	N/A
	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;	No sensitive protective equipment used on this machine.	N/A
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPDs is capable of cycle re-initiation;	No sensitive protective equipment used on this machine.	N/A
	f) with regard to the higher risk resulting from automatic cycle initiation, the AOPD and the associated control system comply with a higher safety-related performance than under normal conditions.	No sensitive protective equipment used on this machine.	N/A
	NOTE 1 The hazard zone as referred to in d) is any zone where the hazardous function (including ancillary equipment and transmission elements) is initiated by clearing of the sensing field.	No sensitive protective equipment used on this machine.	N/A
	NOTE 2 See also IEC/TS 62046.	No sensitive protective equipment used on this machine.	N/A
6.3.2.6	**Protective measures for stability**	-	-
	If stability cannot be achieved by inherently safe design measures such as weight distribution (see 6.2.6), it shall be maintained by the use of protective measures such as	By inherently safe design.	Pass
	□ anchorage bolts,	provided	Pass
	□ locking devices,	Not use	N/A
	□ movement limiters or mechanical stops,	Not use	N/A
	□ acceleration or deceleration limiters,	Not use	N/A
	□ load limiters, and	Not use	N/A
	□ alarms warning of the approach to stability or tipping limits.	Not use	N/A
6.3.2.7	**Other protective devices**	-	-
	When a machine requires continuous control by the operator (for example, mobile machines, cranes) and an error of the operator can	No need to continuous control of this machine.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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,	See above	N/A
	□ when the operator lacks knowledge of the actual value of a safety-related parameter (distance, speed, mass, angle, etc.), and	See above	N/A
	□ when hazards can result from operations other than those controlled by the operator.	See above	N/A
	The necessary devices include	See above	N/A
	a) devices for limiting parameters of movement (distance, angle, velocity, acceleration),	See above	N/A
	b) overloading and moment limiting devices,	See above	N/A
	c) devices to prevent collisions or interference with other machines,	See above	N/A
	d) devices for preventing hazards to pedestrian operators of mobile machinery or other pedestrians,	See above	N/A
	e) torque limiting devices, and breakage points to prevent excessive stress of components and assemblies,	See above	N/A
	f) devices for limiting pressure or temperature,	See above	N/A
	g) devices for monitoring emissions,	See above	N/A
	h) devices to prevent operation in the absence of the operator at the control position,	See above	N/A
	i) devices to prevent lifting operations unless stabilizers are in place,	See above	N/A
	j) devices to limit inclination of the machine on a slope, and	See above	N/A
	k) devices to ensure that components are in a safe position before travelling.	See above	N/A
	Automatic protective measures triggered by such devices that take operation of the machinery out of the control of the operator (for example, automatic stop of hazardous movement) should be preceded or accompanied by a warning signal to enable the operator to take appropriate action (see 6.4.3).	See above	N/A
6.3.3	**Requirements for design of guards and protective devices**	-	-
6.3.3.1	**General requirements**	-	-
	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.	Fixed guards have been designed according to this clause.	Pass
	NOTE For additional information, see ISO	ISO 14120 has been	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	14120, ISO 13849-1, ISO 13851, ISO 14119, ISO 13856, IEC 61496 and IEC 62061.	considered.	
	Guards and protective devices shall	See below	Pass
	a) be of robust construction,	Considered during design.	Pass
	b) not give rise to any additional hazard,	No additional hazard exists.	Pass
	c) not be easy to bypass or render non-operational,	Comply with the requirement	Pass
	d) be located at an adequate distance from the danger zone (see ISO 13855 and ISO 13857),	Comply with the requirement	Pass
	e) cause minimum obstruction to the view of the production process, and	Not obstruction to the view of production process.	Pass
	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.	Comply with the requirement.	Pass
	For openings in the guards, see ISO 13857.	considered	Pass
6.3.3.2	**Requirements for guards**	-	-
6.3.3.2.1	**Functions of guards**	-	-
	The functions that guards can achieve are	See below	Pass
	□ prevention of access to the space enclosed by the guard, and/or	Fixed guards are provided for this function	Pass
	□ 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.	Fixed guards are provided for this function	Pass
	Additionally, they could need to have particular properties relating to electricity, temperature, fire, explosion, vibration, visibility (see ISO 14120) and operator position ergonomics (for example, usability, operator's movements, postures, repetitive movements).	Fixed guards are provided for this function	Pass
6.3.3.2.2	**Requirements for fixed guards**	-	-
	Fixed guards shall be securely held in place either	Fastener provided	Pass
	□ permanently (for example by welding), or	By fastener	N/A
	□ by means of fasteners (screws, nuts) making removal/opening impossible without using tools; they should not remain closed without their fasteners (see ISO 14120).	Screws and nuts are provided to fix the guards.	Pass
	NOTE A fixed guard can be hinged to assist in its opening.	Hinge is provided.	Pass
6.3.3.2.3	**Requirements for movable guards**	-	-
	Movable guards which provide protection against hazards generated by moving transmission parts shall	No this kind of situation	N/A
	a) as far as possible when open remain fixed to the machinery or other structure (generally by means of hinges or guides), and	See above.	Pass
	b) be interlocking (with guard locking when necessary) (see ISO 14119).	See above.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Movable guards against hazards generated by non-transmission moving parts shall be designed and associated with the machine control system so that	See above.	Pass
	□ 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,	See above.	Pass
	□ they can be adjusted only by an intentional action, such as the use of a tool or a key, and	See above.	Pass
	□ 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).	See above.	Pass
	See Figure 4 and ISO 14119.	See above.	Pass
6.3.3.2.4	**Requirements for adjustable guards**	-	-
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed.	No this kind of situation.	N/A
	Manually adjustable guards shall be	See above	N/A
	□ designed so that the adjustment remains fixed during a given operation, and	See above	N/A
	□ readily adjustable without the use of tools.	See above	N/A
6.3.3.2.5	**Requirements for interlocking guards with a start function (control guards)**	-	-
	An interlocking guard with a start function may only be used provided that	No this kind of situation.	N/A
	a) all requirements for interlocking guards are satisfied (see ISO 14119),	No this kind of situation.	N/A
	b) the cycle time of the machine is short,	No this kind of situation.	N/A
	c) the maximum opening time of the guard is preset to a low value (for example, equal to the cycle time) and, when this time is exceeded, the hazardous function(s) cannot be initiated by the closing of the interlocking guard with a start function and resetting is necessary before restarting the machine,	No this kind of situation.	N/A
	d) the dimensions or shape of the machine do not allow a person, or part of a person, to stay in the hazard zone or between the hazard zone and the guard while the guard is closed (see ISO 14120),	No this kind of situation.	N/A
	e) all other guards, whether fixed (removable type) or movable, are interlocking guards,	No this kind of situation.	N/A
	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	No this kind of situation.	N/A
	g) the guard is securely held open (for example,	No this kind of situation.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	by a spring or counterweight) such that it cannot initiate a start while falling by its own weight.		
6.3.3.2.6	**Hazards from guards**	-	-
	Care shall be taken to prevent hazards which could be generated by	See below	Pass
	□ the guard construction (sharp edges or corners, material, noise emission, etc.),	No this kind of risk	Pass
	□ the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall).	No this kind of risk	Pass
6.3.3.3	**Technical characteristics of protective devices**	-	-
	Protective devices shall be selected or designed and connected to the control system such that correct implementation of their safety function(s) is ensured.	Considered during design	Pass
	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.	Fixed guards comply with EN 953	Pass
	Protective devices shall be installed and connected to the control system so that they cannot be easily defeated.	Comply with the requirement	pass
6.3.3.4	**Provisions for alternative types of safeguards**	-	-
	Provisions should be made to facilitate the fitting of alternative types of safeguards on machinery where it is known that it will be necessary to change the safeguards because of the range of work to be carried out.	No this kind of situation	N/A
6.3.4	**Safeguarding to reduce emissions**	-	-
6.3.4.1	**General**	-	-
	If the measures for the reduction of emissions at source specified in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).	See below	Pass
6.3.4.2	**Noise**	-	-
	Additional protective measures against noise include	See below	Pass
	□ enclosures (see ISO 15667),	Enclosure provided for motor.	Pass
	□ screens fitted to the machine, and	Not used	N/A
	□ silencers (see ISO 14163).	Not used	N/A
6.3.4.3	**Vibration**	-	-
	Additional protective measures against vibration include	Not used	N/A
	□ vibration isolators, such as damping devices placed between the source and the exposed person,	Not used	N/A
	□ resilient mounting, and	Not used	N/A
	□ suspended seats.	Not used	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	For measures for vibration isolation of stationary industrial machinery see EN 1299.	Not used	N/A
6.3.4.4	**Hazardous substances**	-	-
	Additional protective measures against hazardous substances include	See below	N/A
	□ encapsulation of the machine (enclosure with negative pressure),	Not used	N/A
	□ local exhaust ventilation with filtration,	Not used	N/A
	□ wetting with liquids, and	Not used	N/A
	□ special ventilation in the area of the machine (air curtains, cabins for operators).	Not used	N/A
	See ISO 14123-1.	Not used	N/A
6.3.4.5	Radiation	-	-
	Additional protective measures against radiation include	See below	N/A
	□ use of filtering and absorption, and	Covered by EMC	N/A
	□ use of attenuating screens or guards.	Covered by EMC	N/A
6.3.5	**Complementary protective measures**	-	-
6.3.5.1	**General**	-	-
	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices), nor information for use, could have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine. Such measures include, but are not limited to, those dealt with in 6.3.5.2 to 6.3.5.6.	Comply with the requirement	Pass
6.3.5.2	**Components and elements to achieve emergency stop function**	-	-
	If, following a risk assessment, a machine needs to be fitted with components and elements to achieve an emergency stop function for enabling actual or impending emergency situations to be averted, the following requirements apply:	No this kind of situation.	N/A
	□ the actuators shall be clearly identifiable, clearly visible and readily accessible;	No this kind of situation.	N/A
	□ the hazardous process shall be stopped as quickly as possible without creating additional hazards, but if this is not possible or the risk cannot be reduced, it should be questioned whether implementation of an emergency stop function is the best solution;	No this kind of situation.	N/A
	□ the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.	No this kind of situation.	N/A
	NOTE For more detailed provisions, see ISO 13850.	No this kind of situation.	N/A
	Once active operation of the emergency stop device has ceased following an emergency stop command, the effect of this command shall be sustained until it is reset. This reset shall be possible only at the location where the emergency stop command has been initiated.	No this kind of situation.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	The reset of the device shall not restart the machinery, but shall only permit restarting.		
	More details for the design and selection of electrical components and elements to achieve the emergency stop function are provided in IEC 60204.	No this kind of situation.	N/A
6.3.5.3	**Measures for the escape and rescue of trapped persons**	-	-
	Measures for the escape and rescue of trapped persons may consist, among others, of	No this kind of risk	N/A
	□ escape routes and shelters in installations generating operator-trapping hazards,	No this kind of risk	N/A
	□ arrangements for moving some elements by hand, after an emergency stop,	No this kind of risk	N/A
	□ arrangements for reversing the movement of some elements,	No this kind of risk	N/A
	□ anchorage points for descender devices,	No this kind of risk	N/A
	□ means of communication to enable trapped operators to call for help.	No this kind of risk	N/A
6.3.5.4	**Measures for isolation and energy dissipation**	-	-
	Machines shall be equipped with the technical means to achieve isolation from power supply(ies) and dissipation of stored energy by means of the following actions:	Main switch has been provided for this kind of application	Pass
	a) isolating (disconnecting, separating) the machine (or defined parts of the machine) from all power supplies;	Main switch has been provided for this kind of application	Pass
	b) locking (or otherwise securing) all the isolating units in the isolating position;	The main switch can be locked by pad lock.	Pass
	c) dissipating or, if this is not possible or practicable, restraining (containing) any stored energy which can give rise to a hazard;	No hazard was found.	N/A
	d) verifying, by means of safe working procedures, that the actions taken according to a), b) and c) above have produced the desired effect.	considered	Pass
	See ISO 14118:2000, Clause 5, and IEC 60204-1:2005, 5.5 and 5.6.	The requirements have been considered.	Pass
6.3.5.5	**Provisions for easy and safe handling of machines and their heavy component parts**	-	-
	Machines and their component parts which cannot be moved or transported by hand shall be provided or be capable of being provided with suitable attachment devices for transport by means of lifting gear.	Lifting gear has been provided, see manual.	Pass
	These attachments may be, among others,	See below	Pass
	□ standardized lifting appliances with slings, hooks, eyebolts, or tapped holes for appliance fixing,	Tapped holes are provided.	Pass
	□ appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground,	No this kind of situation	N/A
	□ fork locating devices for machines to be transported by a lift truck,	Not design for lifting by fork lift.	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	□ lifting and stowing gear and appliances integrated into the machine.	Comply with the requirement	Pass
	Parts of machinery which can be removed manually in operation shall be provided with means for their safe removal and replacement.	Comply with the requirement	Pass
	See also 6.4.4 c), item 3).	See related clause.	Pass
6.3.5.6	**Measures for safe access to machinery**	-	-
	Machinery shall be so designed as to enable operation and all routine tasks relating to setting and/or maintenance to be carried out as far as possible by a person remaining at ground level.	All the setting and maintenance can be carried out at ground level	Pass
	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.	No this kind of situation	N/A
	The walking areas shall be made from materials which remain as slip resistant as practicable under working conditions and, depending on the height from the ground, shall be provided with suitable guard-rails (see ISO 14122-3).	No this kind of situation	N/A
	In large automated installations, particular attention shall be given to safe means of access, such as walkways, conveyor bridges or crossover points.	No this kind of situation	N/A
	Means of access to parts of machinery located at height shall be provided with collective means of protection against falls (for example, guard-rails for stairways, stepladders and platforms and/or safety cages for ladders). As necessary, anchorage points for personal protective equipment against falls from height shall also be provided (for example, in carriers of machinery for lifting persons or with elevating control stations).	No this kind of situation	N/A
	Openings shall, whenever possible, open towards a safe position. They shall be designed to prevent hazards due to unintended opening.	No this kind of situation	N/A
	The necessary aids for access shall be provided (steps, handholds, etc.). Control devices shall be designed and located to prevent their being used as aids for access.	No this kind of situation	N/A
	When machinery for lifting goods and/or persons includes landings at fixed levels, these shall be equipped with interlocking guards for preventing falls when the platform is not present at a level. Movement of the lifting platform shall be prevented while the guards are open.	Not for such use	N/A
	For detailed provisions see ISO 14122.	No this kind of situation	N/A
6.4	**Information for use**	-	-
6.4.1	**General requirements**	-	-
6.4.1.1	Drafting information for use is an integral part of the design of a machine (see Figure 2). Information for use consists of communication	Appropriate information has provided.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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.		
	NOTE See also IEC 62079 for structuring and presentation of information for use.	noted	Pass
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.	Appropriate information has provided.	Pass
	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.	Appropriate information has provided.	Pass
	The information shall indicate, as appropriate,	See below	Pass
	□ the need for training,	No need	N/A
	□ the need for personal protective equipment, and	No need	N/A
	□ the possible need for additional guards or protective devices (see Figure 2, Footnote d).	No need	N/A
	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.	Appropriate information has provided.	Pass
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.	Appropriate information has provided.	Pass
6.4.2	**Location and nature of information for use**	-	-
	Depending on the risk, the time when the information is needed by the user and the machine design, it shall be decided whether the information — or parts thereof — are to be given	Appropriate information has provided.	Pass
	a) in/on the machine itself (see 6.4.3 and 6.4.4),	See related clause	Pass
	b) in accompanying documents (in particular instruction handbook, see 6.4.5),	Manual is provided.	Pass
	c) on the packaging,	Provided.	Pass
	d) by other means such as signals and warnings outside the machine.	Labels are provided	Pass
	Standardized phrases shall be considered where important messages such as warnings are given (see also IEC 62079).	Comply with the requirement	Pass
6.4.3	**Signals and warning devices**	-	-
	Visual signals, such as flashing lights and audible signals such as sirens may be used to warn of an impending hazardous event such as machine start-up or overspeed. Such signals may also be used to warn the operator before	Not used	N/A

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	the triggering of automatic protective measures (see 6.3.2.7).		
	It is essential that these signals	See above	N/A
	a) be emitted before the occurrence of the hazardous event,	See above	N/A
	b) be unambiguous,	See above	N/A
	c) be clearly perceived and differentiated from all other signals used, and	See above	N/A
	d) be clearly recognized by the operator and other persons.	See above	N/A
	The warning devices shall be designed and located such that checking is easy. The information for use shall prescribe regular checking of warning devices.	See above	N/A
	The attention of designers is drawn to the possibility of “sensorial saturation”, which can result from too many visual and/or acoustic signals and which can also lead to defeating the warning devices.	See above	N/A
	NOTE Consultation of the user on this subject is often necessary.	See above	N/A
6.4.4	**Markings, signs (pictograms) and written warnings**	-	-
	Machinery shall bear all markings which are necessary	Appropriate markings are provided.	Pass
	a) for its unambiguous identification, including at least	provided	Pass
	1) the name and address of the manufacturer,	provided	Pass
	2) the designation of series or type, and	provided	Pass
	3) the serial number, if any,	provided	Pass
	b) in order to indicate its compliance with mandatory requirements, comprising	provided	Pass
	1) marking, and	provided	Pass
	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),	Designation of the machinery, year of construction is provide.	Pass
	c) for its safe use, for example,	See below	Pass
	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, and7) frequency of inspection.	Appropriate markings are provided.	Pass
	Information printed directly on the machine should be permanent and remain legible throughout the expected life of the machine.	Comply with the requirement	Pass
	Signs or written warnings indicating only “Danger” shall not be used.	No used	Pass
	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.	Comply with the requirement.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Readily understandable signs (pictograms) should be used in preference to written warnings.		
	Signs and pictograms should only be used if they are understood in the culture in which the machinery is to be used.	Comply with the requirement.	Pass
	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.	No written warnings.	N/A
	NOTE In some countries the use of specific language(s) is covered by legal requirements.	No written warnings.	N/A
	Markings shall comply with recognized standards (for example, ISO 2972 or ISO 7000, for pictograms, symbols and colours in particular).	Comply with the requirement	Pass
	See IEC 60204-1 as regards marking of electrical equipment.	See EN 60204-1 report.	Pass
	See ISO 4413 and ISO 4414 for hydraulic and pneumatic equipment.	Pneumatic equipment complies with the requirement.	Pass
6.4.5	**Accompanying documents (in particular — instruction handbook)**	-	-
6.4.5.1	**Contents**	-	-
	The instruction handbook or other written instructions (for example, on the packaging) shall contain, among others, the following:	See below	Pass
	a) information relating to transport, handling and storage of the machine, such as	See manual.	Pass
	1) storage conditions for the machine,	See manual.	Pass
	2) dimensions, mass value(s), position of the centre(s) of gravity, and	See manual.	Pass
	3) indications for handling (for example, drawings indicating application points for lifting equipment);	See manual.	Pass
	b) information relating to installation and commissioning of the machine, such as	See manual.	Pass
	1) fixing/anchoring and dampening of noise and vibration requirements,	See manual.	Pass
	2) assembly and mounting conditions,	See manual.	Pass
	3) space needed for use and maintenance,	See manual.	Pass
	4) permissible environmental conditions (for example, temperature, moisture, vibration, electromagnetic radiation),	See manual.	Pass
	5) instructions for connecting the machine to power supply (particularly on protection against electrical overloading),	See manual.	Pass
	6) advice on waste removal/disposal, and	See manual.	Pass
	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;	See manual.	Pass
	c) information relating to the machine itself, such as	See manual.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	1) detailed description of the machine, its fittings, guards and/or protective devices,	See manual.	Pass
	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,	See manual.	Pass
	3) diagrams (especially schematic representation of safety functions),	See manual.	Pass
	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,	See manual.	Pass
	5) technical documentation of electrical equipment (see IEC 60204), and	See manual.	Pass
	6) documents attesting that the machine complies with mandatory requirements;	See manual.	Pass
	d) information relating to the use of the machine, such as that related to or describing	See manual.	Pass
	1) intended use,	See manual.	Pass
	2) manual controls (actuators),	See manual.	Pass
	3) setting and adjustment,	See manual.	Pass
	4) modes and means for stopping (especially emergency stop),	See manual.	Pass
	5) risks which could not be eliminated by the protective measures implemented by the designer,	See manual.	Pass
	6) particular risks which can be generated by certain applications, by the use of certain fittings, and about specific safeguards necessary for such applications,	See manual.	Pass
	7) reasonably foreseeable misuse and prohibited applications,	See manual.	Pass
	8) fault identification and location, for repair and for restarting after an intervention, and	See manual.	Pass
	9) personal protective equipment needed to be used and the training that is required;	See manual.	Pass
	e) information for maintenance, such as	See manual.	Pass
	1) the nature and frequency of inspections for safety functions,	See manual.	Pass
	2) specification of the spare parts to be used when these can affect the health and safety of operators,	See manual.	Pass
	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),	See manual.	Pass
	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	See manual.	Pass
	5) drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks);	See manual.	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	f) information relating to dismantling, disabling and scrapping;	See manual.	Pass
	g) information for emergency situations, such as	See below	Pass
	1) the operating method to be followed in the event of accident or breakdown,	No this kind of risk	N/A
	2) the type of fire-fighting equipment to be used, and	No this kind of risk	N/A
	3) a warning of possible emission or leakage of hazardous substance(s) and, if possible, an indication of means for fighting their effects;	No this kind of risk	N/A
	h) maintenance instructions provided for skilled persons [item e) 3) above] and maintenance instructions provided for unskilled persons [item e) 4) above], that need to appear clearly separated from each other.	See manual.	Pass
6.4.5.2	**Production of instruction handbook**	-	-
	The following applies to the production and presentation of the instruction handbook.	See below	Pass
	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.	used	Pass
	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.	English	Pass
	NOTE In some countries the use of specific language(s) is covered by legal requirements.	Noted	Pass
	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.	Appropriate illustrations are used	Pass
	d) Consideration should be given to presenting information in tabular form where this will aid understanding. Tables should be adjacent to the relevant text.	considered	Pass
	e) The use of colours should be considered, particularly in relation to components requiring quick identification.	considered	Pass
	f) When information for use is lengthy, a table of contents and/or an index should be provided.	Provided.	Pass
	g) Safety-relevant instructions which involve immediate action should be provided in a form readily available to the operator.	Comply with the requirement	Pass
6.4.5.3	**Drafting and editing information for use**	-	-
	The following applies to the drafting and editing of information for use.	See below	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	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).	Identified by model number	Pass
	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.	Comply with the requirement	Pass
	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.	Comply with the requirement	Pass
	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.	Comply with the requirement	Pass
	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.	Comply with the requirement	Pass
7	**Documentation of risk assessment and risk reduction**	-	-
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation of	See risk assessment report	Pass
	a) the machinery for which the risk assessment has been made (for example, specifications, limits, intended use);	See above	Pass
	b) any relevant assumptions that have been made (loads, strengths, safety factors, etc.);	See above	Pass
	c) the hazards and hazardous situations identified and the hazardous events considered in the risk assessment;	See above	Pass
	d) the information on which risk assessment was based (see 5.2):	See above	Pass
	1) the data used and the sources (accident histories, experience gained from risk reduction applied to similar machinery, etc.);	See above	Pass
	2) the uncertainty associated with the data used and its impact on the risk assessment;	See above	Pass

EN ISO 12100:2010			
Clause	**Requirement**	**Result**	**Verdict**
	e) the risk reduction objectives to be achieved by protective measures;	See above	Pass
	f) the protective measures implemented to eliminate identified hazards or to reduce risk;	See above	Pass
	g) residual risks associated with the machinery;	See above	Pass
	h) the result of the risk assessment (see Figure 1);	See above	Pass
	i) any forms completed during the risk assessment.	See above	Pass
	Standards or other specifications used to select protective measures referred to in f) above should be referenced.	See above	Pass
	NOTE No requirement is given in this International Standard to deliver the risk assessment documentation together with the machine. See ISO/TR 14121-2 for information on documentation.	**noted**	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
4.1	The risks associated with the hazards relevant to the electrical equipment shall be assessed as part of the overall requirements for risk assesment of the machine. This will determine the adequate risk, reduction and the necessary protective measures for persons who can be exposed to those hazards, while still maintaining an acceptable level of performance of the machine and its equipment.	Considered.	Pass
	Hazardous situations can result from, but are not limited to, the following causes:	Please see the following for detail	Pass
	-failures or faults in the electrical equipment resulting in the possibility of electric shock or electrical fire;	Considered.	Pass
	¨-failures or faults in control circuits (or components and devices associated with those circuits) resulting in the malfunctioning of the machine;	Considered.	Pass
	-disturbances or disruptions in power sources as well as failures or faults in the power circuits resulting in the malfunctioning of the machine;	Considered.	Pass
	-loss of continuity of circuits that depend upon sliding or rolling contacts, resulting in a failure of a safety function;	Considered.	Pass
	-electrical disturbances for example, electromagnetic, electrostatic either from outside the electrical equipment or internally generated, resulting in the malfunctioning of the machine;	Considered.	Pass
	-release of stored energy (either electrical or mechanical) resulting in, for example, electric shock, unexpected movement that can cause injury;	Considered.	Pass
	-Surface temperatures that can cause injury.	Considered.	Pass
	Safety measures are a combination of the measures incorporated at the design stage and those measures required to be implemented by the user.	Considered.	Pass
	The design and development process shall identify hazards and the risks arising from them. Where the hazards cannot be removed and/or the risks cannot be sufficiently reduced by inherently safe design measures, protective measures (for example safeguarding,) shall be provided to reduce the risk. Additional means (for example, awareness means) shall be provided where further risk reduction is necessary. In addition, working procedures that reduce risk can be necessary.	Considered.	Pass
	The use of the enquiry form as shown in Annex B of this part of IEC 60204 is recommended in order to facilitate an appropriate agreement between the user and the supplier(s) on basic conditions and additional user specifications related to the electrical equipment. Those additional specifications are to: -provide additional features that are dependent on the type of machine (or group of machines) and the application; -facilitate maintenance and repair; and -improve the reliability and ease of operation.	Considered.	Pass
4.2	Selection of equipment	-	-
4.2.1	General	-	-
	Electrical components and devices shall: -be suitable for their intended use; and -conform to relevant IEC standards where such exist;		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	and -be applied in accordance with the supplier's instructions.		
4.2.2	Electrical equipment in compliance with the EN 60439 series		-
	The electrical equipment of the machine shall satisfy the safety requirements identified by the risk assessment of the machine. Depending upon the machine, its intended use and its electrical equipment, the designer may select parts of the electrical equipment of the machine that are in compliance with EN 60439-1 and, as necessary, other relevant parts of the EN 60439 series (see also Annex F)		Pass
4.3	Electrical supply	-	-
4.3.1	General	-	-
	The electrical equipment shall be designed to operate correctly with the conditions of the supply: -as specified in 4.3.2 or 4.3.3, or -as otherwise specified by the user (see Annex B), or -as specified by the supplier in the case of a special source of supply such as an on-board generator.		Pass
4.3.2	AC supplies	-	-
	Voltage: Steady state voltage: 0,9 to 1,1 of nominal voltage. Frequency: 0,99 to 1,01 of nominal frequency continuously; 0,98 to 1,02 short time. Harmonics: Harmonic distortion not exceeding 10 % of the total r.m.s. voltage between live conductors for the sum of the 2nd through to the 5th harmonic. An additional 2 % of the total r.m.s. voltage between live conductors for the sum of the 6th through to the 30th harmonic is permissible. Voltage unbalance: Neither the voltage of the negative sequence component nor the voltage of the zero sequence component in three-phase supplies exceeding 2 % of the positive sequence component. Voltage interruption: Supply interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle with more than 1 s between successive interruptions. Voltage dips: Voltage dips not exceeding 20 % of the peak voltage of the supply for more than one cycle with more than 1 s between successive dips.		Pass
4.3.3	DC supplies	-	-
	Voltage 0,85 to 1,15 of nominal voltage; 0,7 to 1,2 of nominal voltage in the case of battery-operated vehicles. Voltage interruption Not exceeding 5 ms. From converting equipment: Voltage 0,9 to 1,1 of nominal voltage. Voltage interruption Not exceeding 20 ms with more than 1 s between successive interruptions.		N/A
4.4	Physical environment and operating conditions	-	-
4.4.1	General	-	-
	The electrical equipment shall be suitable for the physical environment and operating conditions of its intended use. The requirements of 4.4.2 to 4.4.8 cover the physical environment and operating conditions of the majority of machines covered by this part of EN 60204. When special conditions apply or the limits specified are exceeded, an agreement between user and supplier (see 4.1) is recommended (see Annex B)	See instruction manual.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
4.4.2	Electromagnetic compatibility (EMC)	-	-
	The equipment shall not generate electromagnetic disturbances above levels that are appropriate for its intended operating environment. In addition, the equipment shall have a level of immunity to electromagnetic disturbances so that it can function in its intended environment. Measures to limit the generation of electromagnetic disturbances, i.e. conducted and radiated emissions include: -power supply filtering; -cable shielding; -enclosures designed to minimize RF radiation; -RF suppression techniques. Measures to enhance the immunity of the equipment against conducted and radiated RF disturbance include: -design of functional bonding system taking into account the following; -Connection of sensitive electrical circuits to the chassis. Such terminations should be marked or labelled with the symbol IEC 60417-5020 (DB:2002-10): -connection of the chassis to earth (PE) using a conductor with low RF impedance and as short as practicable; -connection of sensitive electrical equipment or circuits directly to the PE circuit or to a functional earthing conductor (FE) (see Figure	DOC by manufacture.	Pass
	2), to minimize common mode disturbance. This latter terminal should be marked or labelled by the symbol IEC 60417-5018 (DB:2002-10): -separation of sensitive circuits from disturbance sources; -enclosures designed to minimize RF transmission; -EMC wiring practices: -using twisted conductors to reduce the effect of differential mode disturbances, -keeping sufficient distance between conductors emitting disturbances and conductors of sensitive circuits, -using cable orientation as close to 90^0C as possible when cables cross, -running the conductors as close as possible to the ground plane, -using electrostatic screens and/or electromagnetic shields with a low RF impedance termination.	DOC of EMC by manufacture.	Pass
4.4.3	Ambient air temperature	-	-
	Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. The minimum requirement for all electrical equipment is correct operation between air temperatures of $+5^0$C and $+40^0$C. For very hot environments (for example hot climates, steel mills, paper mills) and for cold environments, additional measures are recommended (see Annex B).	See user manual.	Pass
4.4.4	Humidity	-	-
	The electrical equipment shall be capable of operating correctly when the relative humidity does not exceed 50 % at a maximum temperature of $+40^0$C. Higher relative humidities are permitted at lower temperatures (for example 90 % at 20^0C). Harmful effects of occasional condensation shall be avoided by design of	See user manual.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	the equipment or, where necessary, by additional measures (for example built-in heaters, air conditioners, drain Holes).		
4.4.5	Altitude	-	-
	Electrical equipment shall be capable of operating correctly at altitudes up to 1 000 m above mean sea level.	See user manual.	Pass
4.4.6	contaminants	-	-
	Electrical equipment shall be adequately protected against the ingress of solids and liquids (see 11.3). The electrical equipment shall be adequately protected against contaminants (for example dust, acids, corrosive gases, salts) that can be present in the physical environment in which the electrical equipment is to be installed (see Annex B).	See user manual.	Pass
4.4.7	Ionizing and non-ionizing radiation	-	-
	When equipment is subject to radiation (for example microwave, ultraviolet, lasers, X-rays), additional measures shall be taken to avoid malfunctioning of the equipment and accelerated deterioration of the insulation. A special agreement is recommended between the supplier and the user (see Annex B).	No such hazard existed.	N/A
4.4.8	Vibration, shock, and bump	-	-
	Undesirable effects of vibration, shock and bump (including those generated by the machine and its associated equipment and those created by the physical environment) shall be avoided by the selection of suitable equipment, by mounting it away from the machine, or by provision of anti-vibration mountings. A special agreement is recommended between the supplier and the user (see Annex B).		Pass
4.5	Transportation and storage	-	-
	Electrical equipment shall be designed to withstand, or suitable precautions shall be taken to protect against, the effects of transportation and storage temperatures within a range of -25^0C to $+55^0$C and for short periods not exceeding 24 h at up to $+70^0$ C. Suitable means shall be provided to prevent damage from humidity, vibration, and shock. A special agreement can be necessary between the supplier and the user (see Annex B).	See user manual.	Pass
4.6	Provisions for handling	-	-
	Heavy and bulky electrical equipment that has to be removed from the machine for transport, or that is independent of the machine, shall be provided with suitable means for handling by cranes or similar equipment.	See user manual.	Pass
4.7	Installation and operation	-	-
	Electrical equipment shall be installed in accordance with the electrical equipment supplier's instructions.	See user manual.	Pass
5	**Incoming supply conductors terminations and devices for disconnecting and switching off**	**-**	-
5.1	Incoming supply conductor terminations	-	-
	It is recommended that, where practicable, the electrical equipment of a machine is connected to a single incoming supply. Where another supply is necessary for certain parts of the equipment (for example, electronic equipment that operates at a	Single power supply.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	different voltage), that supply should be derived, as far as is practicable, from devices (for example, transformers, converters) forming part of the electrical equipment of the machine. For large complex machinery comprising a number of widely-spaced machines working together in a co-ordinated manner, there can be a need for more than one incoming supply depending upon the site supply arrangements (see 5.3.1). Unless a plug is provided with the machine for the connection to the supply (see 5.3.2 e), it is recommended that the supply conductors are terminated at the supply disconnecting device.		
	Where a neutral conductor is used it shall be clearly indicated in the technical documentation of the machine, such as in the installation diagram and in the circuit diagram, and a separate insulated terminal, labelled N in accordance with 16.1, shall be provided for the neutral conductor (see also Annex B).		Pass
	There shall be no connection between the neutral conductor and the protective bonding circuit inside the electrical equipment nor shall a combined PEN terminal be provided. Exception: a connection may be made between the neutral terminal and the PE terminal at the point of the connection of the power supply to the machine for TN-C systems.		Pass
	The supply conductors are terminated at the supply disconnecting device If not, the separate terminals shall be provided	The separate terminals shall be provided.	Pass
	All terminals for the incoming supply connection shall be clearly identified in accordance with IEC 60445 and 16.1. For the identification of the external protective conductor terminal, see 5.2.		Pass
	See 17.8 for the provision of instructions for maintenance.		Pass
5.2	Terminal for connection to the external protective earthing system	-	-
	For each incoming supply, a terminal shall be provided in the vicinity of the associated phase conductor terminals for connection of the machine to the external protective earthing system or to the external protective conductor, depending upon the supply distribution system.		Pass
	The terminal shall be of such a size as to enable the connection of an external protective copper conductor with a cross-sectional area in accordance with Table 1.		Pass
	Where an external protective conductor of a material other than copper is used, the terminal size shall be selected accordingly (see also 8.2.2).		N/A
	At each incoming supply point, the terminal for connection of the external protective earthing system or the external protective conductor shall be marked or labelled with the letters PE (see IEC 60445).		Pass
5.3	Supply disconnecting (isolating) device	-	-
5.3.1	General	-	-
	A supply disconnecting device shall be provided:		Pass
	-for each incoming source of supply to a machine(s);		Pass
	-For each on-board power supply. The supply disconnecting device shall disconnect (isolate) the		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	electrical equipment of the machine from the supply when required (for example for work on the machine, including the electrical equipment).		
	When two or more supply disconnecting devices are provided, protective interlocks for their correct operation shall also be provided in order to prevent a hazardous situation, including damage to the machine or to the work in progress.	Only one supply disconnecting device is provided.	Pass
5.3.2	Type	-	-
	The supply disconnecting device shall be one of the following types:		Pass
	a) switch-disconnector, with or without fuses, in accordance with IEC 60947-3, utilization category AC-23B or DC-23B;		N/A
	b) 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/A
	c) a circuit-breaker suitable for isolation in accordance with IEC 60947-2;		Pass
	d) any other switching device in accordance with an IEC product standard for that device and which meets the isolation requirements of IEC 60947-1 as well as a utilization category defined in the product standard as appropriate for on-load switching of motors or other inductive loads;		N/A
	e) A plug/socket combination for a flexible cable supply.		N/A
5.3.3	Requirements	-	-
	When the supply disconnecting device is one of the types specified in 5.3.2 a) to d) it shall fulfill all of the following requirements:		Pass
	-isolate the electrical equipment from the supply and have one OFF (isolated) and one ON position marked with "O" and "I" (symbols IEC 60417-5008 (DB:2002-10) and IEC 60417-5007 (DB:2002-10), see 10.2.2);		Pass
	-have a visible contact gap or a position indicator which cannot indicate OFF (isolated) until all contacts are actually open and the requirements for the isolating function have been satisfied;		Pass
	-have an external operating means (for example handle), (exception: power-operated switchgear need not be operable from outside the enclosure where there are other means to open it). Where the external operating means is not intended for emergency operations, it is recommended that it be coloured BLACK or GREY (see 10.7.4 and 10.8.4);		Pass
	-be provided with a means permitting it to be locked in the OFF (isolated) position (for example by padlocks). When so locked, remote as well as local closing shall be prevented;		Pass
	-disconnect all live conductors of its power supply circuit. However, for TN supply systems, the neutral conductor may or may not be disconnected except in countries where disconnection of the neutral conductor (when used) is compulsory;		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	-have a breaking capacity sufficient to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads. The calculated breaking capacity may be reduced by the use of a proven diversity factor.		Pass
	When the supply disconnecting device is a plug/socket combination, it shall fulfil the following requirements:		N/A
	-have the switching capability, or be interlocked with a switching device that has a breaking capacity, sufficient to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads. The calculated breaking capacity may be reduced by the use of a proven diversity factor. When the interlocked switching device is electrically operated (for example a contactor) it shall have an appropriate utilisation category.		N/A
	-a) to f) of 13.4.5.		N/A
	Where the supply disconnecting device is a plug/socket combination, a switching device with an appropriate utilisation category shall be provided for switching the machine on and off. This can be achieved by the use of the interlocked switching device described above.		Pass
5.3.4	Operating means	-	-
	The operating means (for example, a handle) of the supply disconnecting device shall be easily accessible and located between 0,6 m and 1,9 m above the servicing level. An upper limit of 1,7 m is recommended.		Pass
5.3.5	Excepted circuits		N/A
	-lighting circuits for lighting needed during maintenance or repair;		N/A
	-plug and socket outlets for the exclusive connection of repair or maintenance tools and equipment (for example hand drills, test equipment);		N/A
	-undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure;		N/A
	-circuits supplying equipment that should normally remain energized for correct operation (for example temperature controlled measuring devices, product (work in progress) heaters, program storage devices);		N/A
	-control circuits for interlocking.		N/A
	It is recommended, however, that such circuits be provided with their own disconnecting device.		N/A
	Where such a circuit is not disconnected by the supply disconnecting device:		N/A
	-permanent warning label(s) in accordance with 16.1 shall be appropriately placed in proximity to the supply disconnecting device;		N/A
	-a corresponding statement shall be included in the maintenance manual, and one or more of the following shall apply; -a permanent warning label in accordance with 16.1 is affixed in proximity to each excepted circuit, or -the excepted circuit is separated from other circuits, or -the conductors are identified by colour taking into account the recommendation of 13.2.4.		N/A
5.4	Devices for switching off for prevention of unexpected start-up	-	-
	Devices for switching off for the prevention of		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	unexpected start-up shall be provided (for example where, during maintenance, a start-up of the machine or part of the machine can create a hazard).		
	Such devices shall be appropriate and convenient for the intended use, shall be suitably placed, and readily identifiable as to their function and purpose (for example by a durable marking in accordance with 16.1 where necessary).		Pass
5.5	Devices for disconnecting electrical equipment	-	-
	Devices shall be provided for disconnecting (isolating) electrical equipment to enable work to be carried out when it is de-energised and isolated. Such devices shall be: -appropriate and convenient for the intended use -suitably placed; -Readily identifiable as to which part(s) or circuit(s) of the equipment is served (for example by durable marking in accordance with 16.1 where necessary).		Pass
	Means shall be provided to prevent inadvertent and/or mistaken closure of these devices either at the controller or from other locations (see also 5.6).	Please see 5.6	Pass
	The supply disconnecting device (see 5.3) may, in some cases, fulfil that function. However, where it is necessary to work on individual parts of the electrical equipment of a machine, or on one of a number of machines fed by a common conductor bar, conductor wire or inductive power supply system, a disconnecting device shall be provided for each part, or for each machine, requiring separate isolation.	Such disconnecting devices have been provided.	Pass
	In addition to the supply disconnecting device, the following devices that fulfil the isolation function may be provided for this purpose:	Please see the following clause.	Pass
	-devices described in 5.3.2; -disconnectors, withdrawable fuse links and withdrawable links only if located in an electrical operating area (see 3.15) and relevant information is provided with the electrical equipment (see 17.2 b)9) and b)12)).	Circuit breakers according to 5.3.2 have been provided.	Pass
5.6	Protection against unauthorized, inadvertent and/or mistaken connection	-	-
	The devices described in 5.4 and 5.5 that are located outside an enclosed electrical operating area shall be equipped with means to secure them in the OFF position (disconnected state), (for example by provisions for padlocking, trapped key interlocking). When so secured, remote as well as local reconnection shall be prevented.	Padlocking is provided against unauthorized, inadvertent and/or mistaken connection	Pass
	Where a non-lockable disconnecting device (for example withdrawable fuse-links, withdrawable links) other means of protection against reconnection (for example warning labels in accordance with 16.1) may be provided.		N/A
	However, when a plug/socket combination according to 5.3.2 e) is so positioned that it can be kept under the immediate supervision of the person carrying out the work, means for securing in the disconnected state need not be provided.		N/A
6	**Protection against electric shock**	-	-
6.1	General	-	-

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	The electrical equipment shall provide protection of persons against electric shock from: -direct contact (see 6.2 and 6.4); -indirect contact (see 6.3 and 6.4).		Pass
	The measures for this protection given in 6.2, 6.3, and, for PELV, in 6.4, are a recommended selection from IEC 60364-4-41. Where those recommended measures are not practicable, for example due to the physical or operational conditions, other measures from IEC 60364-4-41 may be used.		Pass
6.2	Protection against direct contact	-	-
6.2.1	General	-	-
	For each circuit or part of the electrical equipment, the measures of either 6.2.2 or 6.2.3 and, where applicable, 6.2.4 shall be applied.		Pass
	Exception: where those measures are not appropriate, other measures for protection against direct contact (for example by using barriers, by placing out of reach, using obstacles, using construction or installation techniques that prevent access) as defined in IEC 60364-4-41 may be applied (see 6.2.5 and 6.2.6).	No exception exists.	N/A
	When the equipment is located in places open to all persons, which can include children, measures of either 6.2.2 with a minimum degree of protection against direct contact corresponding to IP4X or IPXXD (see IEC 60529), or 6.2.3 shall be applied.	IP54	Pass
6.2.2	Protection by enclosures	-	-
	Live parts shall be located inside enclosures that conform to the relevant requirements of Clauses 4, 11, and 14 and that provide protection against direct contact of at least IP2X or IPXXB (see IEC 60529).	Minimum protection degree for live part while covered by control cabinet is IP2X.	Pass
	Where the top surfaces of the enclosure are readily accessible, the minimum degree of protection against direct contact provided by the top surfaces shall be IP4X or IPXXD.		Pass
	Opening an enclosure (i.e. opening doors, lids, covers, and the like) shall be possible only under one of the following conditions:	-	-
a)	The use of a key or tool is necessary for access. For enclosed electrical operating areas, see IEC 60364-4-41, or IEC 60439-1 as appropriate.		Pass
	All live parts, that are likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, shall be protected against direct contact to at least IP2X or IPXXB. Other live parts on the inside of doors shall be protected against direct contact to at least IP1X or IPXXA.		Pass
b)	The disconnection of live parts inside the enclosure before the enclosure can be opened. This may be accomplished by interlocking the door with a disconnecting device (for example, the supply disconnecting device) so that the door can only be opened when the disconnecting device is open and so that the disconnecting device can only be closed when the door is closed.		Pass
	Exception: a special device or tool as prescribed by the supplier can be used to defeat the interlock provided that:		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	-it is possible at all times while the interlock is defeated to open the disconnecting device and lock the disconnecting device in the OFF (isolated) position or otherwise prevent unauthorised closure of the disconnecting device; -upon closing the door, the interlock is automatically restored; -all live parts, that are likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, are protected against direct contact to at least IP2X or IPXXB and other live parts on the inside of doors are protected against direct contact to at least IP1X or IPXXA; -relevant information is provided with the electrical equipment (see 17.2 b)9) and b)12)).		N/A
	Means shall be provided to restrict access to live parts behind doors not directly interlocked with the disconnecting means to skilled or instructed persons. (See 17.2 b)12)).		N/A
	All parts that are still live after switching off the disconnecting device(s) (see 5.3.5) shall be protected against direct contact to at least IP2X or IPXXB (see IEC 60529). Such parts shall be marked with a warning sign in accordance with 16.2.1 (see also 13.2.4 for identification of conductors by colour).		N/A
	Excepted from this requirement for marking are: -parts that can be live only because of connection to interlocking circuits and that are distinguished by colour as potentially live in accordance with 13.2.4; -The supply terminals of the supply disconnecting device when the latter is mounted alone in a separate enclosure.		N/A
c)	Opening without the use of a key or a tool and without disconnection of live parts shall be possible only when all live parts are protected against direct contact to at least IP2X or IPXXB (see IEC 60529). Where barriers provide this protection, either they shall require a tool for their removal or all live parts protected by them shall be automatically disconnected when the barrier is removed.		N/A
6.2.3	Protection by insulation of live parts	-	-
	Live parts protected by insulation shall be completely covered with insulation that can only be removed by destruction. Such insulation shall be capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it can be subjected under normal operating conditions.		Pass
6.2.4	Protection against residual voltages	-	-
	Live parts having a residual voltage greater than 60 V after the supply has been disconnected shall be discharged to 60 V or less within a time period of 5 s after disconnection of the supply voltage provided that this rate of discharge does not interfere with the proper functioning of the equipment. Exempted from this requirement are components having a stored charge of 60µC or less. Where this specified rate of discharge would interfere with the proper functioning of the equipment, a durable warning notice drawing attention to the hazard and stating the delay required before the enclosure may be opened shall be displayed at an	Less than 5s	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	easily visible location on or immediately adjacent to the enclosure containing the capacitances.		
	In the case of plugs or similar devices, the withdrawal of which results in the exposure of conductors (for example pins), the discharge time shall not exceed 1 s, otherwise such conductors shall be protected against direct contact to at least IP2X or IPXXB. If neither a discharge time of 1 s nor a protection of at least IP2X or IPXXB can be achieved (for example in the case of removable collectors on conductor wires, conductor bars, or slip-ring assemblies, see 12.7.4), additional switching devices or an appropriate warning device (for example a warning notice in accordance with 16.1) shall be applied.		N/A
6.2.5	Protection by barriers	-	-
	For protection by barriers, see 412.2 of IEC 60364-4-41		N/A
6.2.6	Protection by placing out of reach or protection by obstacles	-	-
	For protection by placing out of reach, 412.4 of IEC 60364-4-41 shall apply. For protection by obstacles, 412.3 of IEC 60364-4-41 shall apply.		N/A
	For protection by obstacles see 412.3 of IEC 60364-4-41		N/A
	For conductor wire systems or conductor bar systems with a degree of protection less than IP2X, see 12.7.1.		N/A
6.3	Protection against indirect contact	-	-
6.3.1	General	-	-
	Protection against indirect contact (3.29) is intended to prevent hazardous situations due to an insulation fault between live parts and exposed conductive parts. For each circuit or part of the electrical equipment, at least one of the measures in accordance with 6.3.2 to 6.3.3 shall be applied: -measures to prevent the occurrence of a touch voltage (6.3.2); or -automatic disconnection of the supply before the time of contact with a touch voltage can become hazardous (6.3.3).		Pass
6.3.2	Measure to prevent the occurrence of a hazardous touch voltage	-	-
6.3.2.1	General	-	-
	Measures to prevent the occurrence of a touch voltage include the following: -provision of class II equipment or by equivalent insulation; -electrical separation.		Pass
6.3.2.2	Protection by provision of class II equipment or by equivalent insulation	-	-
	This measure is intended to prevent the occurrence of touch voltages on the accessible parts through a fault in the basic insulation.		Pass
	This protection is provided by one or more of the following: -class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation in accordance with IEC 61140); -switchgear and controlgear assemblies having total insulation in accordance with IEC 60439-1; -supplementary or reinforced insulation in accordance with 413.2 of IEC 60364-4-41.		Pass
6.3.2.3	Protection by electrical separation	-	-
	Electrical separation of an individual circuit is intended		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	to prevent a touch voltage through contact with exposed conductive parts that can be energized by a fault in the basic insulation of the live parts of that circuit. For this type of protection, the requirements of 413.5 of IEC 60364-4-41 apply.		
6.3.3	Protection by automatic disconnection of supply	-	-
	This measure consists of the interruption of one or more of the line conductors by the automatic operation of a protective device in case of a fault. This interruption shall occur within a sufficiently short time to limit the duration of a touch voltage to a time within which the touch voltage is not hazardous. Interruption times are given in Annex A.		Pass
	This measure necessitates co-ordination between: -the type of supply and earthing system; -the impedance values of the different elements of the protective bonding system; -the characteristics of the protective devices that detect insulation fault(s).		Pass
	Automatic disconnection of the supply of any circuit affected by an insulation fault is intended to prevent a hazardous situation resulting from a touch voltage.		Pass
	This protective measure comprises both: -protective bonding of exposed conductive parts (see 8.2.3), -and either: a) overcurrent protective devices for the automatic disconnection of the supply on detection of an insulation fault in TN systems, or b) residual current protective devices to initiate the automatic disconnection of the supply on detection of an insulation fault from a live part to exposed conductive parts or to earth in TT systems, or c) insulation monitoring or residual current protective devices to initiate automatic disconnection of IT systems. Except where a protective device is provided to interrupt the supply in the case of the first earth fault, an insulation monitoring device shall be provided to indicate the occurrence of a first fault from a live part to exposed conductive parts or to earth. This insulation monitoring device shall initiate an audible and/or visual signal which shall continue as long as the fault persists.	TN-system and overcurrent protective devices applied	Pass
	Where automatic disconnection is provided in accordance with a), and disconnection within the time specified in Clause A.1 cannot be assured, supplementary bonding shall be provided as necessary to meet the requirements of Clause A.3.	The time is according to A.1	N/A
6.4	Protection by the use of PELV	-	-
6.4.1	General requirements	-	-
	The use of PELV (Protective Extra-Low Voltage) is to protect persons against electric shock from indirect contact and limited area direct contact (see 8.2.5).	PELV have provided.	Pass
	PELV circuits shall satisfy all of the following conditions:	-	-
	a) the nominal voltage shall not exceed: * 25 V a.c. r.m.s. or 60 V ripple-free d.c. when the equipment is normally used in dry locations and when large area contact of live parts with the human body is not expected; or * 6 V a.c. r.m.s. or 15 V ripple-free d.c. in all other cases;	24V	Pass
	b) one side of the circuit or one point of the source of	One point of the source of	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	the supply of that circuit shall be connected to the protective bonding circuit;	the supply has been connected to the protective bonding circuit.	
	c) live parts of PELV circuits shall be electrically separated from other live circuits. Electrical separation shall be not less than that required between the primary and secondary circuits of a safety isolating transformer (see IEC 61558-1 and IEC 61558-2-6);	Live parts of PELV have been separated from other live circuits.	Pass
	d) conductors of each PELV circuit shall be physically separated from those of any other circuit. When this requirement is impracticable, the insulation provisions of 13.1.3 shall apply;	The PELV circuit has been separated.	N/A
	e) plugs and socket-outlets for a PELV circuit shall conform to the following: 1) plugs shall not be able to enter socket-outlets of other voltage systems; 2) socket-outlets shall not admit plugs of other voltage systems.		N/A
6.4.2	Sources for PELV	-	-
	The source for PELV shall be one of the following: -a safety isolating transformer in accordance with IEC 61558-1 and IEC 61558-2-6; -a source of current providing a degree of safety equivalent to that of the safety isolating transformer (for example a motor generator with winding providing equivalent isolation); -an electrochemical source (for example a battery) or another source independent of a higher voltage circuit (for example a diesel-driven generator); -an electronic power supply conforming to appropriate standards specifying measures to be -taken to ensure that, even in the case of an internal fault, the voltage at the outgoing terminals cannot exceed the values specified in 6.4.1.	Safety isolating transformers	Pass
7	**Protection of equipment**	-	-
7.1	General	-	-
	This Clause details the measures to be taken to protect equipment against the effects of: -overcurrent arising from a short circuit; -overload and/or loss of cooling of motors; -abnormal temperature; -loss of or reduction in the supply voltage; -overspeed of machines/machine elements; -earth fault/residual current; -incorrect phase sequence; -overvoltage due to lightning and switching surges.		Pass
7.2	Overcurrent protection	-	-
7.2.1	General	-	-
	Overcurrent protection shall be provided where the current in a machine circuit can exceed either the rating of any component or the current carrying capacity of the conductors, whichever is the lesser value. The ratings or settings to be selected are detailed in 7.2.10.		Pass
7.2.2	Supply conductors	-	-
	Unless otherwise specified by the user, the supplier of the electrical equipment is not responsible for providing the overcurrent protective device for the supply conductors to the electrical equipment (see Annex B).		Pass
	The supplier of the electrical equipment shall state on the installation diagram the data necessary for selecting the overcurrent protective device (see 7.2.10 and 17.4).		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
7.2.3	Power circuits	-	-
	Devices for detection and interruption of overcurrent, selected in accordance with 7.2.10, shall be applied to each live conductor. The following conductors, as applicable, shall not be disconnected without disconnecting all associated live conductors: -the neutral conductor of a.c. power circuits; -the earthed conductor of d.c. power circuits; -d.c. power conductors bonded to exposed conductive parts of mobile machines.		Pass
	Where the cross-sectional area of the neutral conductor is at least equal to or equivalent to that of the phase conductors, it is not necessary to provide overcurrent detection for the neutral conductor nor a disconnecting device for that conductor. For a neutral conductor with a cross-sectional area smaller than that of the associated phase conductors, the measures detailed in 524 of IEC 60364-5-52 shall apply.		N/A
	in IT systems, it is recommended that the neutral conductor is not used. However, where a neutral conductor is used, the measures detailed in 431.2.2 of IEC 60364-4-43 shall apply.	TN system.	N/A
7.2.4	Control circuits	-	-
	Conductors of control circuits directly connected to the supply voltage and of circuits supplying control circuit transformers shall be protected against overcurrent in accordance with 7.2.3.		Pass
	Conductors of control circuits supplied by a control circuit transformer or d.c. supply shall be protected against overcurrent (see also 9.4.3.1): -in control circuits connected to the protective bonding circuit, by inserting an overcurrent protective device into the switched conductor; -in control circuits not connected to the protective bonding circuit; -where the same cross sectional area conductors are used in all control circuits, by inserting an overcurrent protective device into the switched conductor, and; -where different cross sectional areas conductors are used in different sub-circuits, by inserting an overcurrent protective device into both switched and common conductors of each sub-circuit.		Pass
7.2.5	Socket outlets and their associated conductors	-	-
	Overcurrent protection shall be provided for the circuits feeding the general purpose socket outlets intended primarily for supplying power to maintenance equipment. Overcurrent protective devices shall be provided in the unearthed live conductors of each circuit feeding such socket outlets.		N/A
7.2.6	Lighting circuits	-	-
	All unearthed conductors of circuits supplying lighting shall be protected against the effects of short circuits by the provision of overcurrent devices separate from those protecting other circuits.	Not lighting circuit is provided on this machine.	N/A
7.2.7	Transformers	-	-
	Transformers shall be protected against overcurrent in accordance with the manufacturer's instructions. Such protection shall (see also 7.2.10): -avoid nuisance tripping due to transformer magnetizing inrush currents;	According to manufacture instructions.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	-avoid a winding temperature rise in excess of the permitted value for the insulation class of transformer when it is subjected to the effects of a short circuit at its secondary terminals.		
	The type and setting of the overcurrent protective device should be in accordance with the recommendations of the transformer supplier	According to manufacture instructions.	Pass
7.2.8	Location of overcurrent protective device	-	-
	An overcurrent protective device shall be located at the point where a reduction in the cross-sectional area of the conductors or another change reduces the current-carrying capacity of the conductors, except where all the following conditions are satisfied: -the current carrying capacity of the conductors is at least equal to that of the load; -carrying capacity and the position of the overcurrent protective device is no longer than 3 m; -The conductor is installed in such a manner as to reduce the possibility of a short-circuit, for example, protected by an enclosure or duct.		Pass
7.2.9	Overcurrent protective devices	-	-
	The rated short-circuit breaking capacity shall be at least equal to the prospective fault current at the point of installation. Where the short-circuit current to an overcurrent protective device can include additional currents other than from the supply (for example from motors, from power factor correction capacitors), those currents shall be taken into consideration.		Pass
	A lower breaking capacity is permitted where another protective device (for example the overcurrent protective device for the supply conductors (see 7.2.2) having the necessary breaking capacity is installed on the supply side. In that case, the characteristics of the two devices shall be co-ordinated so that the let-through energy (I^2t) of the two devices in series does not exceed that which can be withstood without damage to the overcurrent protective device on the load side and to the conductors protected by that device (see Annex A of IEC 60947-2).		N/A
	Where fuses are provided as overcurrent protective devices, a type readily available in the country of use shall be selected, or arrangements shall be made for the supply of spare parts.		Pass
7.2.10	Rating and setting of overcurrent protective devices	-	-
	The rated current of fuses or the setting current of other overcurrent protective devices shall be selected as low as possible but adequate for the anticipated overcurrents (for example during starting of motors or energizing of transformers). When selecting those protective devices, consideration shall be given to the protection of switching devices against damage due to overcurrents (for example welding of the switching device contacts).		Pass
	The rated current or setting of an overcurrent protective device is determined by the current carrying capacity of the conductors to be protected in accordance with 12.4, D.2 and the maximum allowable interrupting time t in accordance with Clause D.3, taking into account the needs of co-ordination with other electrical devices in		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	the protected circuit.		
7.3	Protection of motors against overheating	-	-
7.3.1	General	-	-
	Protection of motors against overheating shall be provided for each motor rated at more than 0,5 kW Exceptions: In applications where an automatic interruption of the motor operation is unacceptable (for example fire pumps), the means of detection shall give a warning signal to which the operator can respond.		Pass
	Protection of motors against overheating can be achieved by: -overload protection (7.3.2), -over-temperature protection (7.3.3), or -current-limiting protection (7.3.4).	Overload protection	Pass
	Automatic restarting of any motor after the operation of protection against overheating shall be prevented where this can cause a hazardous situation or damage to the machine or to the work in progress.	Can't automatic restarting.	Pass
7.3.2	Overload protection	-	-
	Where overload protection is provided, detection of overload(s) shall be provided in each live conductor except for the neutral conductor. However, where the motor overload detection is not used for cable overload protection (see also Clause D.2), the number of overload detection devices may be reduced at the request of the user (see also Annex B).		Pass
	For motors having single-phase or d.c. power supplies, detection in only one unearthed live conductor is permitted		Pass
	Where overload protection is achieved by switching off, the switching device shall switch off all live conductors. The switching of the neutral conductor is not necessary for overload protection.		Pass
	Where motors with special duty ratings are required to start or to brake frequently (for example, motors for rapid traverse, locking, rapid reversal, sensitive drilling) it can be difficult to provide overload protection with a time constant comparable with that of the winding to be protected. Appropriate protective devices designed to accommodate special duty motors or over-temperature protection (see 7.3.3) can be necessary.		Pass
	For motors that cannot be overloaded (for example torque motors, motion drives that either are protected by mechanical overload protection devices or are adequately dimensioned), overload protection is not required.		Pass
7.3.3	Over-temperature protection	-	-
	The provision of motors with over-temperature protection (see IEC 60034-11) is recommended in situations where the cooling can be impaired (for example dusty environments). Depending upon the type of motor, protection under stalled rotor or loss of phase conditions is not always ensured by over-temperature protection, and additional protection should then be provided.		N/A
	Over-temperature protection is also recommended for motors that cannot be overloaded (for example torque motors, motion drives that are either protected by mechanical overload protection devices or are adequately dimensioned), where the possibility of		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	over-temperature exists (for example due to reduced cooling).		
7.3.4	Current limiting protection	-	-
	Where protection against the effects of overheating in three phase motors is achieved by current limitation, the number of current limitation devices may be reduced from 3 to 2 (see 7.3.2). For motors having single phase a.c or d.c. power supplies, current limitation in only one unearthed live conductor is permitted.		N/A
7.4	Abnormal temperature protection	-	-
	Resistance heating or other circuits that are capable of attaining or causing abnormal temperatures (for example, due to short-time rating or loss of cooling medium) and therefore can cause a hazardous situation shall be provided with suitable detection to initiate an appropriate control response.		N/A
7.5	Protection against supply interruption or voltage reduction and subsequent restoration	-	-
	Where a supply interruption or a voltage reduction can cause a hazardous situation, damage to the machine, or to the work in progress, undervoltage protection shall be provided by, for example, switching off the machine at a predetermined voltage level.	Under-voltage protection device used.	Pass
	Where the operation of the machine can allow for an interruption or a reduction of the voltage for a short time period, delayed undervoltage protection may be provided. The operation of the undervoltage device shall not impair the operation of any stopping control of the machine		N/A
	Upon restoration of the voltage or upon switching on the incoming supply, automatic or unexpected restarting of the machine shall be prevented where such a restart can cause a hazardous situation.	After voltage interruption and its recovery, restart automatically is not possible	Pass
	Where only a part of the machine or of the group of machines working together in a co-ordinated manner is affected by the voltage reduction or supply interruption, the undervoltage protection shall initiate appropriate control responses to ensure co-ordination.		Pass
7.6	Motor overspeed protection	-	-
	Overspeed protection shall be provided where overspeeding can occur and could possibly cause a hazardous situation taking into account measures in accordance with 9.3.2. Overspeed protection shall initiate appropriate control responses and shall prevent automatic restarting.	Not required	N/A
	The overspeed protection should operate in such a manner that the mechanical speed limit of the motor or its load is not exceeded.		N/A
7.7	Earth fault/residual current protection	-	-
	In addition to providing overcurrent protection for automatic disconnection as described in 6.3, earth fault/residual current protection can be provided to reduce damage to equipment due to earth fault currents less than the detection level of the overcurrent protection.	Not required	N/A
	The setting of the devices shall be as low as possible consistent with correct operation of the equipment.		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
7.8	Phase sequence protection	-	-
	Where an incorrect phase sequence of the supply voltage can cause a hazardous situation or damage to the machine, protection shall be provided.	Not required	N/A
7.9	Protection against overvoltage due to lighting and to switching surges	-	-
	Protective devices can be provided to protect against the effects of overvoltages due to lightning or to switching surges. Where provided: -devices for the suppression of overvoltages due to lightning shall be connected to the incoming terminals of the supply disconnecting device. -devices for the suppression of overvoltages due to switching surges shall be connected across the terminals of all equipment requiring such protection.	Not required	N/A
8	**Equipotential bonding**	-	-
8.1	General	-	-
	This Clause provides requirements for both protective bonding and functional bonding. Figure 2 illustrates those concepts.	-	-
	Protective bonding is a basic provision for fault protection to enable protection of persons against electric shock from indirect contact (see 6.3.3 and 8.2). The objective of functional bonding (see 8.3) is to minimize: -the consequence of an insulation failure which could affect the operation of the machine; -the consequences of electrical disturbances to sensitive electrical equipment which could affect the operation of the machine.		Pass
	Normally functional bonding is achieved by connection to the protective bonding circuit, but where the level of electrical disturbances on the protective bonding circuit is not sufficiently low for proper functioning of electrical equipment, it may be necessary to connect the functional bonding circuit to a separate functional earthing conductor (see Figure 2).		Pass
8.2	Protective bonding circuit	-	-
8.2.1	General	-	-
	The protective bonding circuit consists of: -PE terminal(s) (see 5.2); -the protective conductors in the equipment of the machine including sliding contacts where they are part of the circuit; -the exposed conductive parts and conductive structural parts of the electrical equipment; -those extraneous conductive parts which form the structure of the machine.		Pass
	All parts of the protective bonding circuit shall be so designed that they are capable of withstanding the highest thermal and mechanical stresses that can be caused by earth-fault currents that could flow in that part of the protective bonding circuit.		Pass
	Where the conductance of structural parts of the electrical equipment or of the machine is less than that of the smallest protective conductor connected to the exposed conductive parts, a supplementary bonding conductor shall be provided. This supplementary bonding conductor shall have a cross-sectional area not less than half that of the corresponding protective		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	conductor.		
	If an IT distribution system is used, the machine structure shall be part of the protective bonding circuit and insulation monitoring shall be provided. See 6.3.3 c).		N/A
	Conductive structural parts of equipment in accordance with 6.3.2.2 need not be connected to the protective bonding circuit. Extraneous conductive parts which form the structure of the machine need not be connected to the protective bonding circuit where all the equipment provided is in accordance with 6.3.2.2.		N/A
	Exposed conductive parts of equipment in accordance with 6.3.2.3 shall not be connected to the protective bonding circuit.		N/A
8.2.2	Protective conductors	-	-
	Protective conductors shall be identified in accordance with 13.2.2.		Pass
	Copper conductors are preferred. Where a conductor material other than copper is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor in cross-sectional area. and such conductors shall be not less than 16 mm_2	Copper conductors are used.	Pass
	The cross-sectional area of protective conductors shall be determined in accordance with the requirements of: -543 of IEC 60364-5-54; or -7.4.3.1.7 of IEC 60439-1, as appropriate.	According to table 1.	Pass
	This requirement is met in most cases where the relationship between the cross-sectional area of the phase conductors associated with that part of the equipment and the cross-sectional area of the associated protective conductor is in accordance with Table 1 (see 5.2).		Pass
8.2.3	Continuity of the protective bonding circuit	-	-
	All exposed conductive parts shall be connected to the protective bonding circuit in accordance with 8.2.1. Exception: see 8.2.5.	All conductive parts are earthed correctly (tooth-washer, spring washer used and painting is removed)	Pass
	Where a part is removed for any reason (for example routine maintenance), the protective bonding circuit for the remaining parts shall not be interrupted.		Pass
	Connection and bonding points shall be so designed that their current-carrying capacity is not impaired by mechanical, chemical, or electrochemical influences.		Pass
	Where enclosures and conductors of aluminium or aluminium alloys are used, particular consideration should be given to the possibility of electrolytic corrosion.		Pass
	Metal ducts of flexible or rigid construction and metallic cable sheaths shall not be used as protective conductors. Nevertheless, such metal ducts and the metal sheathing of all connecting cables (for example cable armouring, lead sheath) shall be connected to the protective bonding circuit.	No metal ducts of flexible or rigid construction and metallic cable sheathes are used as protective bonding conductors.	Pass
	Where the electrical equipment is mounted on lids, doors, or cover plates, continuity of the protective bonding circuit shall be ensured and a protective conductor (see 8.2.2) is recommended. Otherwise	Protective conductor has been provided.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	fastenings, hinges or sliding contacts designed to have a low resistance shall be used (see 18.2.2, Test 1).		
	The continuity of the protective conductor in cables that are exposed to damage (for example flexible trailing cables) shall be ensured by appropriate measures (for example monitoring).	No this situation.	N/A
	For requirements for the continuity of the protective conductor using conductor wires conductor bars and slip-ring assemblies, see 12.7.2.		Pass
8.2.4	Exclusion of switching devices from the protective bonding circuit	-	-
	The protective bonding circuit shall not incorporate a switching device or an overcurrent protective device (for example switch, fuse).	No switching device and/or over-current protective device was connected to the protective bonding.	Pass
	No means of interruption of the protective bonding conductor shall be provided. Exception: links for test or measurement purposes that cannot be opened without the use of a tool and that are located in an enclosed electrical operating area.		Pass
	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 be interrupted by a first make last break contact. This also applies to removable or withdrawable plug-in units (see also 13.4.5).		Pass
8.2.5	Parts that need not to be connected to the protective bonding circuit	-	-
	It is not necessary to connect exposed conductive parts to the protective bonding circuit where those parts are mounted so that they do not constitute a hazard because: -they cannot be touched on large surfaces or grasped with the hand and they are small in size (less than approximately 50 mm x 50 mm); or -they are located so that either contact with live parts, or an insulation failure, is unlikely. This applies to small parts such as screws, rivets, and nameplates and to parts inside an enclosure, irrespective of their size (for example electromagnets of contactors or relays and mechanical parts of devices) (see also 410.3.3.5 of IEC 60364-4-41).		Pass
8.2.6	Interruption of the protective bonding circuits	-	-
	All protective conductors shall be terminated in accordance with 13.1.1. The protective conductor connecting points shall have no other function and are not intended, for example, to attach or connect appliances or parts.	No interruption of the protective bonding circuit.	Pass
	Each protective conductor connecting point shall be marked or labelled as such using the symbol IEC 60417-5019 (DB:2002-10): or with the letters PE, the graphical symbol being preferred, or by use of the bicolour combination GREEN-AND-YELLOW, or by any combination of these.		Pass
8.2.7	Mobile machines		
	On mobile machines with on-board power supplies, the protective conductors, the conductive structural parts of the electrical equipment, and those extraneous conductive parts which form the structure of the		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	machine shall all be connected to a protective bonding terminal to provide protection against electric shock. Where a mobile machine is also capable of being connected to an external incoming power supply, this protective bonding terminal shall be the connection point for the external protective conductor.		
8.2.8	Additional protective bonding requirements for electrical equipment having earth leakage currents higher than 10 mA a.c. or d.c.		N/A
	Where electrical equipment has an earth leakage current (for example adjustable speed electrical power drive systems and information technology equipment) that is greater than 10 mA a.c. or d.c. in any incoming supply, one or more of the following conditions for the associated protective bonding circuit shall be satisfied: a) the protective conductor shall have a cross-sectional area of at least 10 mm^2 Cu or 16 mm^2 Al, through its total run; b) where the protective conductor has a cross-sectional area of less than 10 mm^2 Cu or 16 mm^2 Al, a second protective conductor of at least the same cross-sectional area shall be provided up to a point where the protective conductor has a cross-sectional area not less than 10 mm^2 Cu or 16 mm^2 Al. c) automatic disconnection of the supply in case of loss of continuity of the protective conductor.		N/A
	To prevent difficulties associated with electromagnetic disturbances, the requirements of 4.4.2 also apply to the installation of duplicate protective conductors.		N/A
	In addition, a warning label shall be provided adjacent to the PE terminal, and where necessary on the nameplate of the electrical equipment. The information provided under 17.2 b)1) shall include information about the leakage current and the minimum cross-sectional area of the external protective conductor.		N/A
8.3	Functional bonding	-	-
	Protection against maloperation as a result of insulation failures can be achieved by connecting to a common conductor in accordance with 9.4.3.1.		Pass
	For recommendations regarding functional bonding to avoid maloperation due to electromagnetic disturbances, see 4.4.2.	No need.	N/A
8.4	Measures to limit the effects of high leakage current	-	-
	The effects of high leakage current can be restricted to the equipment having high leakage current by connection of that equipment to a dedicated supply transformer having separate windings.		N/A
	The protective bonding circuit shall be connected to exposed conductive parts of the equipment and, in addition, to the secondary winding of the transformer.		N/A
	The protective conductor(s) between the equipment and the secondary winding of the transformer shall comply with one or more of the arrangements described in 8.2.8.		N/A
9	**Control circuits and control functions**	**-**	-
9.1	Control circuits	-	-
9.1.1	Control circuit supply	-	-
	Where control circuits are supplied from an a.c. source, control transformers shall be used for supplying the		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	control circuits. Such transformers shall have separate windings.		
	Where several transformers are used, it is recommended that the windings of those transformers be connected in such a manner that the secondary voltages are in phase.	switching power supply used	Pass
	Where d.c. control circuits derived from an a.c. supply are connected to the protective bonding circuit (see 8.2.1), they shall be supplied from a separate winding of the a.c. control circuit transformer or by another control circuit transformer.		Pass
	Transformers are not mandatory for machines with a single motor starter and/or a maximum of two control devices (for example interlock device, start/stop control station).		Pass
9.1.2	Control circuit voltages	-	-
	The nominal value of the control voltage shall be consistent with the correct operation of the control circuit. The nominal voltage shall not exceed 277 V when supplied from a transformer.	The nominal voltage supplied from power board is 24V.	Pass
9.1.3	Protection	-	-
	Control circuits shall be provided with overcurrent protection in accordance with 7.2.4 and 7.2.10.	The overcurrent protective has been provided.	Pass
9.2	Control functions	-	-
9.2.1	Start functions	-	-
	Start functions shall operate by energizing the relevant circuit (see 9.2.5.2).	Start function are operated properly.	Pass
9.2.2	Stop functions	-	-
	There are three categories of stop functions as follows: -stop category 0: stopping by immediate removal of power to the machine actuators (i.e. an uncontrolled stop -see 3.56); -stop category 1: a controlled stop (see 3.11) with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved; -stop category 2: a controlled stop with power left available to the machine actuators.	Category 0 stop has been Provided.	Pass
9.2.3	Operating modes	-	-
	Each machine can have one or more operating modes determined by the type of machine and its application. When a hazardous situation can result from a mode selection, unauthorised and/or inadvertent selection shall be prevented by suitable means (for example key operated switch, access code).	No operating mode provided.	N/A
	Mode selection by itself shall not initiate machine operation. A separate actuation of the start control shall be required.		N/A
	For each specific operating mode, the relevant safety functions and/or protective measures shall be implemented.		N/A
	Indication of the selected operating mode shall be provided (for example the position of a mode selector, the provision of an indicating light, a visual display indication).		N/A
9.2.4	Suspension of safety functions and/or protective measures	-	-
	Where it is necessary to suspend safety functions and/or protective measures (for example for setting or maintenance purposes), protection shall be ensured		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	by: -disabling all other operating (control) modes; and -other relevant means (see 4.11.9 of ISO 12100-2:2003), that can include, for example, one or more of the following: -initiation of operation by a hold-to-run device or by a similar control device; -a portable control station with an emergency stop device and, where appropriate, an enabling device. Where a portable control station is in use, initiation of motion shall only be possible from that control station; -a cableless control station with a device to initiate stop functions in accordance with 9.2.7.3 and, where appropriate, an enabling device. Where a cableless control station is in use, initiation of motion shall only be possible from that control station; -limitation of the speed or the power of motion; -limitation of the range of motion.		
9.2.5	Operation	-	-
9.2.5.1	General	-	-
	The necessary safety functions and/or protective measures (for example interlocks (see 9.3)) shall be provided for safe operation.		Pass
	Measures shall be taken to prevent movement of the machine in an unintended or unexpected manner after any stopping of the machine (for example due to locked-off condition, power supply fault, battery replacement, lost signal condition with cableless control).		N/A
	Where a machine has more than one control station, measures shall be provided to ensure that initiation of commands from different control stations do not lead to a hazardous situation.	Just one control station.	N/A
9.2.5.2	Start	-	-
	The start of an operation shall be possible only when all of the relevant safety functions and/or protective measures are in place and are operational except for conditions as described in 9.2.4.		Pass
	On those machines (for example mobile machines) where safety functions and/or protective measures cannot be applied for certain operations, manual control of such operations shall be by hold-to-run controls, together with enabling devices, as appropriate.		N/A
	Suitable interlocks shall be provided to secure correct sequential starting.		N/A
	In the case of machines requiring the use of more than one control station to initiate a start, each of these control stations shall have a separate manually actuated start control device. The conditions to initiate a start shall be: -all required conditions for machine operation shall be met, and -all start control devices shall be in the released (off) position, then -all start control devices shall be actuated concurrently (see 3.6).	Just one control station.	N/A
9.2.5.3	Stop	-	-
	Stop category 0 and/or stop category 1 and/or stop category 2 stop functions shall be provided as indicated by the risk assessment and the functional requirements of the machine (see 4.1).	Category 0 stop is provided for the machine.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Stop functions shall override related start functions (see 9.2.5.2)	Stop functions was prior start functions	Pass
	Where required, facilities to connect protective devices and interlocks shall be provided. If such a protective device or interlock causes a stop of the machine, it may be necessary for that condition to be signalled to the logic of the control system. The reset of the stop function shall not initiate any hazardous situation.		Pass
	Where more than one control station is provided, stop commands from any control station shall be effective when required by the risk assessment of the machine.	Just one control station	N/A
9.2.5.4	Emergency operations (emergency stop, emergency switching off)	-	-
9.2.5.4.1	General	-	-
	This part of IEC 60204 specifies the requirements for the emergency stop and the emergency switching off functions of the emergency operations listed in Annex E, both of which are, in this part of IEC 60204, initiated by a single human action.	The emergency operations is comply with this standard	Pass
	Once active operation of an emergency stop (see 10.7) or emergency switching off (see 10.8) actuator has ceased following a command, the effect of this command shall be sustained until it is reset. This reset shall be possible only by a manual action at that location where the command has been initiated. The reset of the command shall not restart the machinery but only permit restarting.		Pass
9.2.5.4.2	Emergency stop	-	-
	Principles for the design of emergency stop equipment, including functional aspects, are given in ISO 13850.	According to ISO 13850	Pass
	The emergency stop shall function either as a stop category 0 or as a stop category 1 (see 9.2.2). The choice of the stop category of the emergency stop depends on the results of a risk assessment of the machine.	Category 0 stop	Pass
	In addition to the requirements for stop (see 9.2.5.3), the emergency stop function has the following requirements: -it shall override all other functions and operations in all modes; -power to the machine actuators that can cause a hazardous situation(s) shall be either removed immediately (stop category 0) or shall be controlled in such a way to stop the hazardous motion as quickly as possible (stop category 1) without creating other hazards; -reset shall not initiate a restart		Pass
9.2.5.4.3	Emergency switching off	-	-
	The functional aspects of emergency switching off are given in 536.4 of IEC 60364-5-53.		Pass
	Emergency switching off should be provided where: -protection against direct contact (for example with conductor wires, conductor bars, slip-ring assemblies, controlgear in electrical operating areas) is achieved only by placing out of reach or by obstacles (see 6.2.6); or -there is the possibility of other hazards or damage caused by electricity.		Pass
	Emergency switching off is accomplished by switching off the relevant incoming supply by electromechanical switching devices, effecting a stop category 0 of machine actuators connected to this incoming supply. When a machine cannot tolerate this stop category 0		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	stop, it may be necessary to provide other measures, for example protection against direct contact, so that emergency switching off is not necessary.		
9.2.5.5	Monitoring of command actions	-	-
	Movement or action of a machine or part of a machine that can result in a hazardous situation shall be monitored by providing, for example, overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices.		N/A
9.2.5.6	Hold-to-run controls	-	-
	Hold-to-run controls shall require continuous actuation of the control device(s) to achieve operation.		Pass
9.2.5.7	Two-hand control	-	-
	Three types of two-hand control are defined in ISO 13851, the selection of which is determined by the risk assessment. These shall have the following features: Type I: this type requires: -the provision of two control devices and their concurrent actuation by both hands; -continuous concurrent actuation during the hazardous situation; -machine operation shall cease upon the release of either one or both of the control devices when hazardous situations are still present. A Type I two-hand control device is not considered to be suitable for the initiation of hazardous operation. Type II: a type I control requiring the release of both control devices before machine operation can be reinitiated. Type III: a type II control requiring concurrent actuation of the control devices as follows: -it shall be necessary to actuate the control devices within a certain time limit of each other, not exceeding 0,5 s; -where this time limit is exceeded, both control devices shall be released before machine operation can be initiated.		N/A
9.2.5.8	Enabling device	-	-
	Enabling control (see also 10.9) is a manually activated control function interlock that: a) when activated allows a machine operation to be initiated by a separate start control, and b) when de-activated -initiates a stop function in accordance with 9.2.5.3, and -prevents initiation of machine operation.	No enabling device used.	N/A
	Enabling control shall be so arranged as to minimize the possibility of defeating, for example by requiring the de-activation of the enabling control device before machine operation may be reinitiated. It should not be possible to defeat the enabling function by simple means.	No enabling device used.	N/A
9.2.6	Combined start and stop controls	-	-
	Push-buttons and similar control devices that, when operated, alternately initiate and stop motion shall only be provided for functions which cannot result in a hazardous situation.		N/A
9.2.7	Cableless control	-	-
9.2.7.1	General	-	-
	This subclause deals with the functional requirements of control systems employing cableless (for example radio, infra-red) techniques for transmitting commands and signals between a machine control system and	No cableless control is used.	N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	operator control station(s).		
	Means shall be provided to readily remove or disconnect the power supply of the operator control station (see also 9.2.7.3).	No cableless control is used.	N/A
	Each operator control station shall carry an unambiguous indication of which machine is intended to be controlled by that operator control station		N/A
	Means (for example key operated switch, access code) shall be provided, as necessary, to prevent unauthorized use of the operator control station.		N/A
	Each operator control station shall carry an unambiguous indication of which machine(s) is (are) intended to be controlled by that operator control station.		N/A
9.2.7.2	Control limitation		N/A
	Measures shall be taken to ensure that control commands: -affect only the intended machine; -affect only the intended functions.		N/A
	Measures shall be taken to prevent the machine from responding to signals other than those from the intended operator control station(s).		N/A
	Where necessary, means shall be provided so that the machine can only be controlled from operator control stations in one or more predetermined zones or locations.		N/A
9.2.7.3	Stop	-	-
	Cableless control stations shall include a separate and clearly identifiable means to initiate the stop function of the machine or of all the operations that can cause a hazardous situation. The actuating means to initiate this stop function shall not be marked or labelled as an emergency stop device (see10.7).		N/A
	A machine which is equipped with cableless control shall have a means of automatically initiating the stopping of the machine and of preventing a potentially hazardous operation, in the following situations: -when a stop signal is received; -when a fault is detected in the cableless control system; -when a valid signal (which includes a signal that communication is established and maintained) has not been detected within a specified period of time (see Annex B), except when a machine is executing a pre-programmed task taking it outside the range of the cableless control where no hazardous situation can occur.		N/A
9.2.7.4	Use of more than one operator control station	-	-
	Where a machine has more than one operator control station, including one or more cableless control stations, measures shall be provided to ensure that only one of the control stations can be enabled at a given time. An indication of which operator control station is in control of the machine shall be provided at suitable locations as determined by the risk assessment of the machine. Exception: a stop command from any one of the control stations shall be effective when required by the risk assessment of the machine.		N/A
9.2.7.5	Battery-powered operator control stations	-	-
	A variation in the battery voltage shall not cause a hazardous situation. If one or more potentially		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	hazardous motions are controlled using a battery-powered cableless operator control station, a clear warning shall be given to the operator when a variation in battery voltage exceeds specified limits. Under those circumstances, the cableless operator control station shall remain functional long enough for the operator to put the machine into a non-hazardous situation.		
9.3	Protective interlocks	-	-
9.3.1	Reclosing or resetting of an interlocking safeguard	-	-
	The reclosing or resetting of an interlocking safeguard shall not initiate hazardous machine operation.	No this kind of guard	N/A
9.3.2	Exceeding operating limits	-	-
	Where an operating limit (for example speed, pressure, position) can be exceeded leading to a hazardous situation, means shall be provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action.		N/A
9.3.3	Operation of auxiliary functions	-	-
	The correct operation of auxiliary functions shall be checked by appropriate devices (for example pressure sensors).		N/A
	Where the non-operation of a motor or device for an auxiliary function (for example lubrication, supply of coolant, swarf removal) can cause a hazardous situation, or cause damage to the machine or to the work in progress, appropriate interlocking shall be provided.		N/A
9.3.4	Interlocks between different operations and for contrary motions	-	-
	All contactors, relays, and other control devices that control elements of the machine and that can cause a hazardous situation when actuated at the same time (for example those which initiate contrary motion), shall be interlocked against incorrect operation.		N/A
	Reversing contactors (for example those controlling the direction of rotation of a motor) shall be interlocked in such a way that in normal service no short circuit can occur when switching.		N/A
	Where, for safety or for continuous operation, certain functions on the machine are required to be interrelated, proper co-ordination shall be ensured by suitable interlocks. For a group of machines working together in a co-ordinated manner and having more than one controller, provision shall be made to co-ordinate the operations of the controllers as necessary.		N/A
	Where a failure of a mechanical brake actuator can result in the brake being applied when the associated machine actuator is energized and a hazardous situation can result, interlocks shall be provided to switch off the machine actuator.		N/A
9.3.5	Reverse current braking	-	-
	Where braking of a motor is accomplished by current reversal, measures shall be provided to prevent the motor starting in the opposite direction at the end of braking where that reversal can cause a hazardous situation or damage to the machine or to the work in progress. For this purpose, a device operating		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	exclusively as a function of time is not permitted.		
	Control circuits shall be so arranged that rotation of a motor shaft, for example manually, shall not result in a hazardous situation.		N/A
9.4	Control functions in the event of failure	-	-
9.4.1	General requirements	-	-
	Where failures or disturbances in the electrical equipment can cause a hazardous situation or damage to the machine or to the work in progress, appropriate measures shall be taken to minimize the probability of the occurrence of such failures or disturbances. The required measures and the extent to which they are implemented, either individually or in combination, depend on the level of risk associated with the respective application (see 4.1).		Pass
	The electrical control circuits shall have an appropriate level of safety performance that has been determined from the risk assessment at the machine. The requirements of IEC 62061 and/or ISO 13849-1, ISO 13849-2 shall apply.		Pass
	Measures to reduce those risks include but are not limited to: -protective devices on the machine (for example interlocking guards, trip devices); -protective interlocking of the electrical circuit; -use of proven circuit techniques and components (see 9.4.2.1); -provision of partial or complete redundancy (see 9.4.2.2) or diversity (see 9.4.2.3); -provision for functional tests (see 9.4.2.4).		N/A
	Where memory retention is achieved for example, by battery power, measures shall be taken to prevent hazardous situations arising from failure or removal of the battery.		N/A
	Means shall be provided to prevent unauthorized or inadvertent memory alteration by, for example, requiring the use of a key, access code or tool.		N/A
9.4.2	Measures to minimize risk in the event of failure	-	-
9.4.2.1	Use of proven circuit techniques and components	-	-
	These measures include but are not limited to: -bonding of control circuits to the protective bonding circuit for functional purposes (see 9.4.3.1 and Figure 2); -connection of control devices in accordance with 9.4.3.1; -stopping by de-energizing (see 9.2.2); -the switching of all control circuit conductors to the device being controlled (see 9.4.3.1); -switching devices having direct opening action (see IEC 60947-5-1); -circuit design to reduce the possibility of failures causing undesirable operations.		Pass
9.4.2.2	Provisions for redundancy	-	-
	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 situation. Redundancy can be effective in normal operation (on-line redundancy) or designed as special circuits that take over the protective function (off-line redundancy) only where the operating function fails. Where off-line redundancy which is not active during normal operation is provided, suitable measures shall be taken to ensure that those control circuits are available when required.	No need according to risk assessment.	N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
9.4.2.3	Use of diversity	-	-
	The use of control circuits having different principles of operation, or using different types of components or devices can reduce the probability of hazards resulting from faults and/or failures. Examples include: -the combination of normally open and normally closed contacts operated by interlocking guards; -the use of different types of control circuit components in the circuit; -the combination of electromechanical and electronic equipment in redundant configurations.	No need according to risk assessment.	N/A
	The combination of electrical and non-electrical systems (for example mechanical, hydraulic, pneumatic) may perform the redundant function and provide the diversity.	No need according to risk assessment.	N/A
9.4.2.4	Functional tests	-	-
	Functional tests may be carried out automatically by the control system, or manually by inspection or tests at start-up and at predetermined intervals, or a combination as appropriate (see also 17.2 and 18.6).		N/A
9.4.3	Protection against maloperation due to earth faults, voltage interruptions and loss of circuit continuity	The mal-operation mentioned in this clause could be detected by the manual test system.	Pass
9.4.3.1	Earth faults	-	-
	Earth faults on any control circuit shall not cause unintentional starting, potentially hazardous motions, or prevent stopping of the machine.		Pass
	Methods to meet these requirements include but are not limited to the following:		Pass
	Method a) Control circuits, fed by control transformers: 1) In case of earthed control circuit supplies, the common conductor is connected to the protective bonding circuit at the point of supply. All contacts, solid state elements etc., which are intended to operate an electromagnetic or other device (for example, a relay, indicator light) are inserted between one side, the switched conductor of the control circuit supply and one terminal of the coil or device. The other terminal of the coil or device (preferably always having the same marking) is connected directly to the common conductor of the control circuit supply without any switching elements (see Figure 3). Exception: Contacts of protective devices may be connected between the common conductor and the coils, provided that: -the circuit is interrupted automatically in the event of an earth fault, or -the connection is very short (for example in the same enclosure) so that an earth fault is unlikely (for example overload relays). 2) Control circuits fed from a control transformer and not connected to the protective bonding circuit, having the same arrangement as shown in Figure 3 and provided with a device that interrupts the circuit automatically in the event of an earth fault (see also 7.2.4).		Pass
	Method b) Control circuits fed from a control transformer with a centre-tapped winding, this centre tap connected to the protective bonding circuit, arranged as shown in Figure 4 with the overcurrent protective device having switching elements in all control circuit supply conductors.		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Method c) Where the control circuit is not fed from a control transformer and is either: 1) directly connected between the phase conductors of an earthed supply, or; 2) directly connected between the phase conductors or between a phase conductor and a neutral conductor of a supply that is not earthed or is earthed through a high impedance, Multi-pole control switches that switch all live conductors are used for START or STOP of those machine functions that can cause a hazardous situation or damage to the machine in the event of unintentional starting or failure to stop, or in the case of c) 2), a device shall be provided that interrupts the circuit automatically in the event of an earth fault.		N/A
9.4.3.2	Voltage interruptions	-	-
	The requirements detailed in 7.5 shall apply.		Pass
	Where the control system uses a memory device(s), proper functioning in the event of power failure shall be ensured (for example by using a non-volatile memory) to prevent any loss of memory that can result in a hazardous situation.		Pass
9.4.3.3	Loss of circuit continuity	-	-
	Where the loss of continuity of safety-related control circuits depending upon sliding contacts can result in a hazardous situation, appropriate measures shall be taken (for example by duplication of the sliding contacts).		Pass
10	**Operator interface and machine-mounted control devices**	**-**	-
10.1	General	-	-
10.1.1	General device requirements	-	-
	This Clause contains requirements for devices mounted outside or partially outside control enclosures.	-	-
	As far as is practicable, those devices shall be selected, mounted, and identified or coded in accordance with relevant parts of IEC 61310.		Pass
	The possibility of inadvertent operation shall be minimized by, for example, positioning of devices, suitable design, provision of additional protective measures. Particular consideration shall be given to the selection, arrangement, programming and use of operator input devices such as touchscreens, keypads and keyboards, for the control of hazardous machine operations. See IEC 60447.		Pass
10.1.2	Location and mounting	-	-
	As far as is practicable, machine-mounted control devices shall be: -readily accessible for service and maintenance; -mounted in such a manner as to minimize the possibility of damage from activities such as material handling.		Pass
	The actuators of hand-operated control devices shall be selected and installed so that: -they are not less than 0,6 m above the servicing level and are within easy reach of the normal working position of the operator; -the operator is not placed in a hazardous situation when operating them.		Pass
	The actuators of foot-operated control devices shall be selected and installed so that: -they are within easy reach of the normal working position of the operator;		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	-the operator is not placed in a hazardous situation when operating them.		
10.1.3	Protection	-	-
	The degree of protection (see IEC 60529) together with other appropriate measures shall afford protection against: -the effects of aggressive liquids, vapours, or gases found in the physical environment or used on the machine; -the ingress of contaminants (for example swarf, dust, particulate matter).	The degree of protection was IP54.	Pass
	In addition, the operator interface control devices shall have a minimum degree of protection against direct contact of IPXXD (see IEC 60529).	The degree of protection was IPxxD	Pass
	Position sensors (for example position switches, proximity switches) shall be so arranged that they will not be damaged in the event of overtravel.		N/A
	Position sensors in circuits with safety-related control functions shall have direct opening action (see IEC 60947-5-1) or shall provide similar reliability (see 9.4.2).		N/A
10.1.5	Portable and pendant control stations	-	-
	Portable and pendant operator 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 (for example if the operator control station is dropped or strikes an obstruction) (see also 4.4.8).		N/A
10.2	Push-buttons	-	-
10.2.1	Colours	-	-
	Push-button actuators shall be colour-coded according to table 2		Pass
	The colours for START/ON actuators should be WHITE, GREY, BLACK or GREEN with a preference for WHITE. RED shall not be used.		Pass
	The colour RED shall be used for emergency stop and emergency switching off actuators.		Pass
	The colours for STOP/OFF actuators should be BLACK, GREY, or WHITE with a preference for BLACK. GREEN shall not be used. RED is permitted, but it is recommended that RED is not used near an emergency operation device.		N/A
	WHITE, GREY, or BLACK are the preferred colours for push-button actuators that alternately act as START/ON and STOP/OFF push-buttons. The colours RED, YELLOW, or GREEN shall not be used (see also 9.2.6).		Pass
	WHITE, GREY, or BLACK are the preferred colours for push-button actuators that cause operation while they are actuated and cease the operation when they are released (for example hold-to-run). The colours RED, YELLOW, or GREEN shall not be used.		Pass
	Reset push-buttons shall be BLUE, WHITE, GREY, or BLACK. Where they also act as a STOP/OFF button, the colours WHITE, GREY, or BLACK are preferred with the main preference being for BLACK. GREEN shall not be used.		Pass
	Where the same colour WHITE, GREY, or BLACK is		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	used for various functions (for example WHITE for START/ON and for STOP/OFF actuators) a supplementary means of coding (for example shape, position, symbol) shall be used for the identification of push-button actuators.		
10.2.2	Markings	-	-
	In addition to the functional identification as described in 16.3, it is recommended that push-buttons be marked, near to or preferably directly on the actuators, with the symbols given in Table 3.		Pass
10.3	Indicator lights and displays	-	-
10.3.1	Modes of use	-	-
	Indicator lights and displays serve to give the following types of information: -indication: to attract the operator's attention or to indicate that a certain task should be performed. The colours RED, YELLOW, BLUE, and GREEN are normally used in this mode; for flashing indicator lights and displays, see 10.3.3. -Confirmation: to confirm a command, or a condition, or to confirm the termination of a change or transition period. The colours BLUE and WHITE are normally used in this mode and GREEN may be used in some cases.	The indication lights were used according to this clause.	Pass
	Indicator lights and displays shall be selected and installed in such a manner as to be visible from the normal position of the operator (see also IEC 61310-1).	Indicator lights and displays were selected from IEC 1310-1	Pass
	Indicator light circuits used for warning lights shall be fitted with facilities to check the operability of these lights.		N/A
10.3.2	Colours	-	-
	Unless otherwise agreed between the supplier and the user (see Annex B), indicator lights shall be colour-coded with respect to the condition (status) of the machine in accordance with Table 4.		N/A
10.3.3	Flashing lights	-	-
	For further distinction or information and especially to give additional emphasis, flashing lights and displays can be provided for the following purposes: -to attract attention; -to request immediate action; -to indicate a discrepancy between the command and actual state; -to indicate a change in process (flashing during transition).		Pass
	It is recommended that higher frequency flashing lights or display be used for higher priority information (see IEC 60073 for recommended flashing rates and pulse/pause ratios).		Pass
	Where flashing lights or displays are used to provide higher priority information, audible warning devices should also be provided.		Pass
10.4	Illuminated push-buttons	-	-
	Illuminated push-button actuators shall be colour-coded in accordance with Tables 2 and 4. Where there is difficulty in assigning an appropriate colour, WHITE shall be used. The colour RED for the emergency stop actuator shall not depend on the illumination of its light.		N/A
10.5	Rotary control devices	-	-
	Devices having a rotational member, such as		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	potentiometers and selector switches, shall have means of prevention of rotation of the stationary member. Friction alone shall not be considered sufficient.		
10.6	Start devices	-	-
	Actuators used to initiate a start function or the movement of machine elements (for example slides, spindles, carriers) shall be constructed and mounted so as to minimize inadvertent operation. However, mushroom-type actuators may be used for two-hand control (see also ISO 13851).		Pass
10.7	Devices for emergency stop	-	-
10.7.1	Location	-	-
	Devices for emergency stop shall be readily accessible		Pass
	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 (exception: see 9.2.7.3).		Pass
	There can be circumstances where confusion can occur between active and inactive emergency stop devices caused by disabling the operator control station. In such cases, means (for example, information for use) shall be provided to minimise confusion.		N/A
10.7.2	Types	-	-
	The types of device for emergency stop include: -a push-button operated switch with a palm or mushroom head type; -a pull-cord operated switch; -a pedal-operated switch without a mechanical guard.		Pass
	The devices shall have direct opening operation (see IEC 60947-5-1, Annex K).		Pass
10.7.3	Colour of actuators	-	-
	Actuators of emergency stop devices shall be coloured RED. If a background exists immediately around the actuator, then this background shall be coloured YELLOW. See also ISO 13850.		Pass
10.7.4	Local operation of the supply disconnecting device to effect emergency stop	-	-
	The supply disconnecting device may be locally operated to serve the function of emergency stop when: -it is readily accessible to the operator; and -it is of the type described in 5.3.2 a), b), c), or d).		N/A
	When also intended for such use, the supply disconnecting device shall meet the colour requirements of 10.7.3.		N/A
10.8	Devices for emergency switching off	-	-
10.8.1	Location of emergency switching off devices	-	-
	Emergency switching off devices shall be located as necessary for the given application. Normally, those devices will be located separate from operator control stations. Where it is necessary to provide a control station with an emergency stop device and an emergency switching off device, means shall be provided to avoid confusion between these devices.		N/A
10.8.2	Types of emergency switching off device	-	-
	The types of device for emergency switching off include: -a push-button operated switch with a palm or mushroom head type of actuator; -a pull-cord operated switch.		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	The devices shall have direct opening action (see IEC 60947-5-1, Annex K).		N/A
	The push-button operated switch may be in a break-glass enclosure.		N/A
10.8.3	Colour of actuators	-	-
	Actuators of emergency switching off devices shall be coloured RED. If a background exists immediately around the actuator, then this background shall be coloured YELLOW.		N/A
	Where confusion can occur between emergency stop and emergency switching off devices, means shall be provided to minimise confusion.		N/A
10.8.4	Local operation of the supply disconnecting device to effect emergency switching off	-	-
	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 10.8.3.		N/A
10.8.5	Local operation of the supply disconnecting device to effect emergency switching off	-	-
	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		N/A
10.9	Enabling control device	-	-
	When an enabling control device is provided as a part of a system, it shall signal the enabling control to allow operation when actuated in one position only. In any other position, operation shall be stopped or prevented.		N/A
	Enabling control devices shall be selected and arranged so as to minimize the possibility of defeating.		N/A
	Enabling control devices shall be selected that have the following features: -designed in accordance with ergonomic principles; -for a two-position type: -position 1: off-function of the switch (actuator is not operated); -position 2: enabling function (actuator is operated). -for a three-position type: -position 1: off-function of the switch (actuator is not operated); -position 2: enabling function (actuator is operated in its mid position); -position 3: off-function (actuator is operated past its mid position); -when returning from position 3 to position 2, the enabling function is not activated.		N/A
11	Controlgear: location, mounting, and enclosures	-	-
11.1	General requirements	-	-
	All controlgear shall be located and mounted so as to facilitate: -its accessibility and maintenance; -its protection against the external influences or conditions under which it is intended to operate; -operation and maintenance of the machine and its associated equipment.		Pass
11.2	Location and mounting	-	-
11.2.1	Accessibility and maintenance	-	-
	All items of controlgear shall be placed and oriented so that they can be identified without moving them or the wiring. For items that require checking for correct operation or that are liable to need replacement, those actions should be possible without dismantling other equipment or parts of the machine (except opening		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	doors or removing covers, barriers or obstacles). Terminals not part of controlgear components or devices shall also conform to these requirements.		
	All controlgear shall be mounted so as to facilitate its operation and maintenance from the front. Where a special tool is necessary to adjust, maintain, or remove a device, such a tool shall be supplied.		Pass
	Where access is required for regular maintenance or adjustment, the relevant devices shall be located between 0,4 m and 2,0 m above the servicing level.	No need.	N/A
	It is recommended that terminals be at least 0,2 m above the servicing level and be so placed that conductors and cables can be easily connected to them.		Pass
	No devices except devices for operating, indicating, measuring, and cooling shall be mounted on doors or on normally removable access covers of enclosures. Where control devices are connected through plug-in arrangements, their association shall be made clear by type (shape), marking or reference designation, singly or in combination (see 13.4.5).		Pass
	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 malfunctioning.		Pass
	Plug/socket combinations that are handled during normal operation shall be located and mounted so as to provide unobstructed access.		Pass
	Test points for connection of test equipment, where provided, shall be: – mounted so as to provide unobstructed access; – clearly identified to correspond with the documentation (see 17.3); – adequately insulated; – sufficiently spaced.		N/A
11.2.2	Physical separation or grouping	-	-
	Non-electrical parts and devices, not directly associated with the electrical equipment, shall not be located within enclosures containing controlgear.		Pass
	Devices such as solenoid valves should be separated from the other electrical equipment (for example in a separate compartment).	No this kind of equipment was found.	N/A
	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.		Pass
	Terminals shall be separated into groups for: – power circuits; – associated control circuits; – other control circuits, fed from external sources (for example for interlocking).		Pass
	The groups may be mounted adjacently, provided that (for example by markings, by use of different sizes, by use of barriers or by colours).		Pass
	When arranging the location of devices (including interconnections), the clearances and creepage distances specified for them by the supplier shall be maintained, taking into account the external influences or conditions of the physical environment.		Pass
11.2.3	Heating effects		
	Heat generating components (for example heat sinks,		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	power resistors) shall be so located that the temperature of each component in the vicinity remains within the permitted limit.		
11.3	Degrees of protection	-	-
	The protection of controlgear against ingress of solid foreign objects and of liquids shall be adequate taking into account the under which the machine is intended to operate (i.e. the location and the physical environmental conditions) and shall be sufficient against dust, coolants, and swarf.		Pass
	Enclosures of controlgear : at least IP 22		Pass
	Exceptions: a) Where an electrical operating area is used as a protective enclosure for an appropriate degree of protection against the ingress of solid bodies and liquids. b) Where removable collectors on conductor wire or conductor bar systems are used and IP22 is not achieved, but the measures of 6.2.5 are applied.	No exception.	N/A
11.4	**Enclosures, doors and openings**	-	-
	Enclosures shall be constructed using materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity and other environmental factors that are likely to be encountered in normal service.		Pass
	Fasteners used to secure doors and covers should be of the captive type.		Pass
	Windows provided for viewing internally mounted indicating devices shall be of a material suitable to withstand mechanical stress and chemical attack (for example toughened glass or polycarbonate sheet of not less than 3 mm thickness).		Pass
	It is recommended that enclosure doors be not wider than 0,9 m and have vertical hinges, with an angle of opening of at least 95°.		Pass
	The joints or gaskets of doors, lids, covers and enclosures shall withstand the chemical effects of the aggressive liquids, vapours, or gases used on the machine.		N/A
	The means provided 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 securely attached to either the door/cover or the enclosure; – not deteriorate due to removal or replacement of the door or the cover, and so impair the degree of protection		Pass
	Where openings in enclosures are provided (for example, for cable access), including those towards the floor or foundation or to other parts of the machine, means shall be provided to ensure the degree of protection specified for the equipment. Openings for cable entries shall be easily re-opened on site. A suitable opening may be provided in the base of enclosures within the machine so that moisture due to condensation can drain away.		Pass
	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	No opening was found between enclosures containing electrical equipment and	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	penetrate. This requirement does not apply to electrical devices specifically designed to operate in oil (for example electromagnetic clutches) nor to electrical equipment in which coolants are used.	compartments containing coolant, lubricating or hydraulic fluids, or those into which oil, other liquids, or dust can penetrate.	
	Where there are holes in an enclosure for mounting purposes, means may be necessary to ensure that after mounting, the holes do not impair the required protection	The holes on enclosure can't impair the required protection.	Pass
	Equipment that, in normal or abnormal operation, can attain a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material shall: – be located within an enclosure that will withstand, without risk of fire or harmful effect, such temperatures as can be generated; and – – be mounted and located at a sufficient distance from adjacent equipment so as to allow safe dissipation of heat (see also 11.2.3); or – be otherwise screened by material that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment.	No such hazard.	N/A
11.5	Access to controlgear	-	-
	Doors in gangways and for access to electrical operating areas shall: – be at least 0,7 m wide and 2,1 m high; – open outwards; – have a means (for example panic bolts) to allow opening from the inside without the use of a key or tool.		N/A
	Enclosures which readily allow a person to fully enter shall be provided with means to allow escape, for example panic bolts on the inside of doors.		N/A
	Enclosures intended for such access, for example for resetting, adjusting, maintenance, shall have a clear width of at least 0,7 m and a clear height of at least 2,1 m In cases where: – equipment is likely to be live during access; and – conducting parts are exposed, The clear width shall be at least 1,0 m. In cases where such parts are present on both sides of the access way, the clear width shall be at least 1,5 m.		N/A
12	Conductors and cables		
12.1	General requirement		
	Conductors and cables shall be selected so as to be suitable for the operating conditions (for example voltage, current, protection against electric shock, grouping of cables) and external influences (for example ambient temperature, presence of water or corrosive substances, mechanical stresses (including stresses during installation), fire hazards) that can exist.		Pass
	These requirements do not apply to the integral wiring of assemblies, subassemblies, and devices that are manufactured and tested in accordance with their relevant IEC standard (for example IEC 60439-1).		Pass
12.2	Conductors	-	-
	In general, conductors shall be of copper. Where aluminium conductors are used, the crosssectional area shall be at least 16 mm2.		Pass
	To ensure adequate mechanical strength, the cross-sectional area of conductors should not be less		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	than as shown in Table 5. Class 1 and class 2 conductors are primarily intended for use between rigid, non-moving parts		
	All conductors that are subject to frequent movement (for example one movement per hour of machine operation) shall have flexible stranding of class 5 or class 6.		N/A
12.3	Insulation	-	-
	The types of insulation include (but are not limited to): – polyvinyl chloride (PVC); – rubber, natural and synthetic; – silicone rubber (SiR); – mineral; – cross-linked polyethylene (XLPE); – ethylene propylene compound (EPR).	The insulation is PVC	Pass
	Where the insulation of conductors and cables (for example PVC) can constitute hazards due to the propagation of a fire or the emission of toxic or corrosive fumes, guidance from the cable supplier should be sought. It is important to give special attention to the integrity of a circuit having a safety-related function.	According to supplier guidance.	Pass
	The insulation of cables and conductors used, shall be suitable for a test voltage: – not less than 2 000 V a.c. for a duration of 5 min for operation at voltages higher than 50 V a.c. or 120 V d.c., or – not less than 500 V a.c. for a duration of 5 min for PELV circuits (see IEC 60364-4-41, class III equipment).	The insulation of cables has been test by manufacture and the result is acceptable.	Pass
	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.		Pass
12.4	Current-carrying capacity in normal service	-	-
	The current-carrying capacity depends on several factors, for example insulation material, number of conductors in a cable, design (sheath), methods of installation, grouping and ambient temperature. NOTE 1 Detailed information and further guidance can be found in IEC 60364-5-52, in some national standards or given by the manufacturer.		Pass
	One typical example of the current-carrying capacities for PVC insulated wiring between enclosures and individual items of equipment under steady-state conditions is given in Table 6.		Pass
12.5	Conductor and cable voltage drop	-	-
	The voltage drop from the point of supply to the load shall not exceed 5 % of the nominal voltage under normal operating conditions. In order to conform to this requirement, it can be necessary to use conductors having a larger cross-sectional area than that derived from Table 6.		Pass
12.6	Flexible cables	-	-
12.6.1	General	-	-
	Flexible cables shall have Class 5 or Class 6 conductors.		Pass
	Cables that are subjected to severe duties shall be of adequate construction to protect against: – abrasion	No this situation.	N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	due to mechanical handling and dragging across rough surfaces; – kinking due to operation without guides; – stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums.		
12.6.2	Mechanical rating	-	-
	The cable handling system of the machine shall be so designed to keep the tensile stress of the conductors as low as is practicable during machine operations. Where copper conductors are used, the tensile stress applied to the conductors shall not exceed 15 N/mm2 of the copper cross-sectional area. Where the demands of the application exceed the tensile stress limit of 15 N/mm2, cables with special construction features should be used and the allowed maximal tensile stress should be agreed with the cable manufacturer.		Pass
	The maximum stress applied to the conductors of flexible cables with material other than copper shall be within the cable manufacturer's specification. NOTE The following conditions affect the tensile stress on the conductors: – acceleration forces; – speed of motion; – dead (hanging) weight of the cables; – method of guiding; – design of cable drum system.		N/A
12.6.3	Current-carry capacity of cables wound on drums	-	-
	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.		N/A
	For cables of circular cross-sectional area installed on drums, the maximum current-carrying capacity in free air should be derated in accordance with Table 7 (see also Clause 44 of IEC 60621-3).		N/A
12.7	Collector wires, collector bars and slip-ring assemblies	-	-
12.7.1	Protection against direct contact	-	-
	Conductor wires, conductor bars and slip-ring assemblies shall be installed or enclosed in such a way that, during normal access to the machine, protection against direct contact is achieved by the application of one of the following protective measures: – protection by partial insulation of live parts, or where this is not practicable; – protection by enclosures or barriers of at least IP2X (see 412.2 of IEC 60364-4-41).		N/A
	Horizontal top surfaces of barriers or enclosures that are readily accessible shall provide a degree of protection of at least IP4X (see 412.2.2 of IEC 60364-4-41).		N/A
	Where the required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching off in accordance with 9.2.5.4.3 shall be applied.		N/A
	Conductor wires and conductor bars shall be so placed and/or protected as to: – prevent contact, especially for unprotected conductor wires and conductor bars, with conductive items such as the cords of pull-cord switches, strain-relief devices and drive chains; – prevent damage from a swinging load.		N/A
12.7.2	Protective conductor circuit	-	-

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Where conductor wires, conductor bars and slip-ring assemblies are installed as part of the protective bonding circuit, they shall not carry current in normal operation. Therefore, the protective conductor (PE) and the neutral conductor (N) shall each use a separate conductor wire, conductor bar or slip-ring. The continuity of the protective conductor circuit using sliding contacts shall be ensured by taking appropriate measures (for example, duplication of the current collector, continuity monitoring).		N/A
12.7.3	Protective conductor current collectors	-	-
	Protective conductor current collectors shall have a shape or construction so that they are not interchangeable with the other current collectors.		N/A
	such current collectors shall be of the sliding contact type		N/A
12.7.4	Removable current collectors with a disconnector function	-	-
	Removable current collectors having a disconnector function shall be so designed that the protective conductor circuit is interrupted only after the live conductors have been disconnected, and the continuity of the protective conductor circuit is re-established before any live conductor is reconnected (see also 8.2.4).		N/A
12.7.5	Clearance in air	-	-
	Clearances between the respective conductors, and between adjacent systems, of conductor wires, conductor bars, slip-ring assemblies and their current collectors shall be suitable for at least a rated impulse voltage of an overvoltage category III in accordance with IEC 60664-1.		N/A
12.7.6	Creepage distances	-	-
	Creepage distances between the respective conductors, between adjacent systems of conductor wires, conductor bars and slip-ring assemblies, and their current collectors shall be suitable for operation in the intended environment, for example open air (IEC 60664-1), inside buildings, protected by enclosures.		N/A
	In abnormally dusty, moist or corrosive environments, the following creepage distance requirements apply: – unprotected conductor wires, conductor bars, and slip-ring assemblies shall be equipped with insulators with a minimum creepage distance of 60 mm; – enclosed conductor wires, insulated multipole conductor bars and insulated individual conductor bars shall have a minimum creepage distance of 30 mm.		N/A
	The manufacturer's recommendations shall be followed regarding special measures to prevent a gradual reduction in the insulation values due to unfavourable ambient conditions (for example deposits of conductive dust, chemical attack).		N/A
12.7.7	Conductor system sectioning	-	-
	Where conductor wires or conductor bars are arranged so that they can be divided into isolated sections, suitable design measures shall be employed to prevent the energization of adjacent sections by the current collectors themselves.		Pass
12.7.8	Construction and installation of collector wire, collector	-	-

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	bar systems and slip-ring assemblies		
	Conductor wires, conductor bars and slip-ring assemblies in power circuits shall be grouped separately from those in control circuits.		N/A
	Conductor wires, conductor bars and slip-ring assemblies shall be capable of withstanding,without damage, the mechanical forces and thermal effects of short-circuit currents.		N/A
	Removable covers for conductor wire and conductor bar systems laid underground or underfloor shall be so designed that they cannot be opened by one person without the aid of a tool.		N/A
	Where conductor bars are installed in a common metal enclosure, the individual sections of the enclosure shall be bonded together and connected to a protective bonding conductor at several points depending upon their length.		N/A
	Metal covers of conductor bars laid underground or underfloor shall also be bonded together and connected to a protective bonding conductor.		N/A
	The protective bonding circuit shall include the covers or cover plates of metal enclosures or underfloor ducts. Where metal hinges form a part of the bonding circuit, their continuity shall be verified (see Clause 18).		N/A
13	**Wiring practices**	**-**	-
13.1	Connections and routing	-	-
13.1.1	General requirements	-	-
	All connections, especially those of the protective bonding circuit, shall be secured against accidental loosening.		Pass
	The means of connection shall be suitable for the cross-sectional areas and nature of the conductors being terminated.		Pass
	The connection of two or more conductors to one terminal is permitted only in those cases where the terminal is designed for that purpose. However, only one protective conductor shall be connected to one terminal connecting point.		Pass
	Soldered connections shall only be permitted where terminals are provided that are suitable for soldering.		N/A
	Terminals on terminal blocks shall be plainly marked or labelled to correspond with markings on the diagrams.		Pass
	Where an incorrect electrical connection (for example, arising from replacement of devices) can be a source of risk and it is not practicable to reduce the possibility of incorrect connection by design measures, the conductors and/or terminations shall be identified in accordance with 13.2.1.		Pass
	The installation of flexible conduits and cables shall be such that liquids shall drain away from the fittings.	No flexible conduit was found.	N/A
	Means of retaining conductor strands shall be provided when terminating conductors at devices or terminals that are not equipped with this facility. Solder shall not be used for that purpose.		Pass
	Shielded conductors shall be so terminated as to prevent fraying of strands and to permit easy disconnection.		Pass
	Identification tags shall be legible, permanent, and		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	appropriate for the physical environment		
	Terminal blocks shall be mounted and wired so that the internal and external wiring does not cross over the terminals (see IEC 60947-7-1).		Pass
13.1.2	Conductor and cable runs	-	-
	Conductors and cables shall be run from terminal to terminal without splices or joints.		Pass
	Connections using plug/socket combinations with suitable protection against accidental disconnection are not considered to be joints for the purpose of this Subclause. **Exception:** Where it is impracticable to provide terminals in a junction box (for example on mobile machines, on machines having long flexible cables; cable connections exceeding a length which is not practical to be supplied by the cable manufacturer on one cable drum; repair of cable due to mechanical stresses during installation and operation), splices or joints may be used.		Pass
	Where it is necessary to connect and disconnect cables and cable assemblies, a sufficient extra length shall be provided for that purpose.		Pass
	The terminations of cables shall be adequately supported to prevent mechanical stresses at the terminations of the conductors.		Pass
	Wherever practicable, the protective conductor shall be placed close to the associated live conductors in order to decrease the impedance of the loop.		Pass
13.1.3	Conductors of different circuits	-	-
	Conductors of different circuits may be laid side by side, may occupy the same duct (for example conduit, cable trunking system), or may be in the same multiconductor cable provided that the arrangement does not impair the proper functioning of the respective circuits. Where those circuits operate at different voltages, the conductors shall be separated by suitable barriers or shall be insulated for the highest voltage to which any conductor within the same duct can be subjected, for example line to line voltage for unearthed systems and phase to earth voltage for earthed systems.		Pass
13.2	Identification of conductors	-	-
13.2.1	General requirements	-	-
	Each conductor shall be identifiable at each termination in accordance with the technical documentation (see Clause 17).		Pass
	It is recommended (for example to facilitate maintenance) that conductors be identified by number, alphanumeric, colour (either solid or with one or more stripes), or a combination of colour and numbers or alphanumeric.		Pass
	When numbers are used, they shall be Arabic; letters shall be Roman (either upper or lower case).		Pass
13.2.2	Identification of the protective conductor	-	-
	The protective conductor shall be readily distinguishable by shape, location, marking, or colour. When identification is by colour alone, the bicolour combination GREEN-ANDYELLOW shall be used throughout the length of the conductor. This colour	Distinguishable by marking and color. And the colour was GREEN-ANDYELLOW.	Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	identification is strictly reserved for the protective conductor.		
	For insulated conductors, the bicolour combination GREEN-AND-YELLOW shall be such that on any 15 mm length, one of the colours covers at least 30 % and not more than 70 % of the surface of the conductor, the other colour covering the remainder of the surface.	Every colour covers at least 30% and not more than 70%.	Pass
	Where the protective conductor can be easily identified by its shape, position, or construction (for example a braided conductor, uninsulated stranded conductor), or where the insulated conductor is not readily accessible, colour coding throughout its length is not necessary but the ends or accessible locations shall be clearly identified by the graphical symbol IEC 60417-5019 (DB:2002-10) or by the bicolour combination GREEN-AND-YELLOW.		Pass
13.2.3	Identification of the neutral conductor	-	-
	Where a circuit includes a neutral conductor that is identified by colour alone, the colour used for this conductor shall be BLUE. In order to avoid confusion with other colours, it is recommended that an unsaturated blue be used, called here “light blue” (see 3.2.2 of IEC 60446). Where the selected colour is the sole identification of the neutral conductor, that colour shall not be used for identifying any other conductor where confusion is possible.	Only colour of neutral conductor is light blue.	Pass
	Where identification by colour is used, bare conductors used as neutral conductors shall be either coloured by a stripe, 15 mm to 100 mm wide in each compartment or unit and at each accessible location, or coloured throughout their length.	No bare neutral conductor used on this machine.	N/A
13.2.4	Identification by colour	-	-
	Where colour-coding is used for identification of conductors (other than the protective conductor (see 13.2.2) and the neutral conductor (see 13.2.3)), the following colours may be used: BLACK, BROWN, RED, ORANGE, YELLOW, GREEN		Pass
	It is recommended that, where colour is used for identification, the colour be used throughout the length of the conductor either by the colour of the insulation or by colour markers at regular intervals and at the ends or accessible location.		Pass
	For safety reasons, the colour GREEN or the colour YELLOW should not be used where there is a possibility of confusion with the bicolour combination GREEN-AND-YELLOW (see 13.2.2).		Pass
	Colour identification using combinations of those colours listed above may be used provided there can be no confusion and that GREEN or YELLOW is not used except in the bicolour combination GREEN-AND-YELLOW.		Pass
	Where colour-coding is used for identification of conductors, it is recommended that they be colour-coded as follows: – BLACK: a.c. and d.c. power circuits; – RED: a.c. control circuits; – BLUE: d.c. control circuits; – ORANGE: excepted circuits in accordance with 5.3.5. **Exceptions:** to the above are permitted		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	where: – insulation is used that is not available in the colours recommended; or – multiconductor cable is used, but not the bicolour combination GREEN-AND-YELLOW		
13.3	Wiring inside enclosures	-	-
	Conductors inside enclosures shall be supported where necessary to keep them in place.		Pass
	Non-metallic ducts shall be permitted only when they are made with a flame-retardant insulating material (see the IEC 60332 series).		Pass
	It is recommended that electrical equipment mounted inside enclosures be designed and constructed in such a way as to permit modification of the wiring from the front of the enclosure (see also 11.2.1). Where that is not practicable and control devices are connected from the rear of the enclosure, access doors or swingout panels shall be provided.		Pass
	Connections to devices mounted on doors or to other movable parts shall be made using flexible conductors in accordance with 12.2 and 12.6 to allow for the frequent movement of the part. The conductors shall be anchored to the fixed part and to the movable part independently of the electrical connection (see also 8.2.3 and 11.2.1).		Pass
	Conductors and cables that do not run in ducts shall be adequately supported		Pass
	Terminal blocks or plug/socket combinations shall be used for control wiring that extends beyond the enclosure.	Terminal blocks have been used.	Pass
	For plug/socket combinations, see also 13.4.5 and 13.4.6.		Pass
	Power cables and cables of measuring circuits may be directly connected to the terminals of the devices for which the connections were intended.		Pass
13.4	Wiring outside enclosures	-	-
13.4.1	General requirements	-	-
	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 not reduced (see 11.3).		Pass
13.4.2	External ducts	-	-
	Conductors and their connections external to the electrical equipment enclosure(s) shall be enclosed in suitable ducts (i.e. conduit or cable trunking systems) as described in 13.5 except for suitably protected cables that may be installed without ducts and with or without the use of open cable trays or cable support means. Where devices such as position switches or proximity switches are supplied with a dedicated cable, their cable need not be enclosed in a duct when the cable is suitable for the purpose, sufficiently short, and so located or protected, that the risk of damage is minimized.		Pass
	Fittings used with ducts or multiconductor cable shall be suitable for the physical environment	No Fittings used	N/A
	Flexible conduit or flexible multiconductor cable shall be used where it is necessary to employ flexible connections to pendant push-button stations. The weight of the pendant stations shall be supported by	No any pendant station is used.	N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	means other than the flexible conduit or the flexible multiconductor cable, except where the conduit or cable is specifically designed for that purpose.		
13.4.3	Connection to moving elements of the machine	-	-
	Connections to frequently moving parts shall be made using conductors in accordance with 12.2 and 12.6.		N/A
	Flexible cable and flexible conduit shall be so installed as to avoid excessive flexing and straining, particularly at the fittings.		N/A
	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/A
	When this is achieved by the provision of a loop, it shall have sufficient length to provide for a bending radius of the cable of at least 10 times the diameter of the cable.		N/A
	Where flexible conduit is adjacent to moving parts, the construction and supporting means shall prevent damage to the flexible conduit under all conditions of operation.		N/A
	Flexible conduit shall not be used for connections subject to rapid or frequent movements except when specifically designed for that purpose.		N/A
13.4.4	Interconnection of devices on the machine	-	-
	Where several machine-mounted switching devices (for example position sensors, pushbuttons) are connected in series or in parallel, it is recommended that the connections between those devices be made through terminals forming intermediate test points.		N/A
	Such terminals shall be conveniently placed, adequately protected, and shown on the relevant diagrams.		N/A
13.4.5	Plug/socket combinations	-	-
	Where plug/socket combinations are provided, they shall fulfil one or more of the following requirements as applicable: **Exception:** The following requirements do not apply to components or devices inside an enclosure, terminated by fixed plug/socket combinations (no flexible cable), or components connected to a bus system by a plug/socket combination. a) When installed correctly in accordance with f), plug/socket combinations shall be of such a type as to prevent unintentional contact with live parts at any time, including during insertion or removal of the connectors. The degree of protection shall be at least IPXXB. PELV circuits are excepted from this requirement. b) Have a first make last break protective bonding contact (earthing contact) (see also 6.3, 8.2.4) if used in TN-or TT-systems. c) Plug/socket combinations intended to be connected or disconnected during load conditions shall have sufficient load-breaking capacity. Where the plug/socket combination is rated at 30 A, or greater, it shall be interlocked with a switching device so that the connection and disconnection is possible only when the switching device is in the OFF position. d) Plug/socket combinations that are rated at more than 16 A shall have a retaining means to prevent unintended or accidental disconnection. e) Where an unintended or accidental disconnection of plug/socket combinations		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	can cause a hazardous situation, they shall have a retaining means.		
	The installation of plug/socket combinations shall fulfil the following requirements as applicable: f) The component which remains live after disconnection shall have a degree of protection of at least IP2X or IPXXB, taking into account the required clearance and creepage distances. PELV circuits are excepted from this requirement. g) Metallic housings of plug/socket combinations shall be connected to the protective bonding circuit. PELV circuits are excepted from this requirement. h) Plug/socket combinations intended to carry power loads but not to be disconnected during load conditions shall have a retaining means to prevent unintended or accidental disconnection and shall be clearly marked that they are not intended to be disconnected under load. i) Where more than one plug/socket combination is provided in the same electrical equipment, the associated combinations shall be clearly identifiable. It is recommended that mechanical coding be used to prevent incorrect insertion. j) Plug/socket combinations used in control circuits shall fulfil the applicable requirements of IEC 61984. **Exception:** see item k). k) Plug/socket combinations intended for household and similar general purposes shall not be used for control circuits. In plug/socket combinations in accordance with IEC 60309-1, only those contacts shall be used for control circuits which are intended for those purposes. **Exception:** The requirements of item k) do not apply to control functions using high frequency signals on the power supply.	No live after disconnection. And all the related requirements have been complied with.	Pass
13.4.6	Dismantling for shipment	-	-
	Where it is necessary that wiring be disconnected for shipment, terminals or plug/socket combinations shall be provided at the sectional points. Such terminals shall be suitably enclosed and plug/socket combinations shall be protected from the physical environment during transportation and storage	No such disconnection for shipment.	N/A
13.4.7	Additional conductors	-	-
	Consideration should be given to providing additional conductors for maintenance or repair.	No spare conductor need for maintenance or repair.	N/A
	When spare conductors are provided, they shall be connected to spare terminals or isolated in such a manner as to prevent contact with live parts.	No any spare conductor was found during inspection.	N/A
13.5	Ducts, connection boxes and other boxes	-	-
13.5.1	General requirements	-	-
	Ducts shall provide a degree of protection suitable for the application (see IEC 60529).		Pass
	All sharp edges, flash, burrs, rough surfaces, or threads with which the insulation of the conductors can come in contact shall be removed from ducts and fittings. Where necessary, additional protection consisting of a flame-retardant, oil-resistant insulating material shall be provided to protect conductor insulation.		Pass
	Drain holes of 6 mm diameter are permitted in cable trunking systems, connection boxes, and other boxes used for wiring purposes that can be subject to	No this kind of risk.	N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	accumulations of oil or moisture.		
	In order to prevent confusion of conduits with oil, air, or water piping, it is recommended that the conduits be either physically separated or suitably identified.	Not applicable	N/A
	Ducts and cable trays shall be rigidly supported and positioned at a sufficient distance from moving parts and in such a manner so as to minimize the possibility of damage or wear.		Pass
	In areas where human passage is required, the ducts and cable trays shall be mounted at least 2 m above the working surface.		N/A
	Ducts shall be provided only for mechanical protection (see 8.2.3 for requirements for connection to the protective bonding circuit).		Pass
	Cable trays that are partially covered should not be considered to be ducts or cable trunking systems (see 13.5.6), and the cables used shall be of a type suitable for installation with or without the use of open cable trays or cable support means.		N/A
13.5.2	Percentage fill of ducts	-	-
	Consideration of the percentage fill of ducts should be based on the straightness and length of the duct and the flexibility of the conductors. It is recommended that the dimensions and arrangement of the ducts be such as to facilitate the insertion of the conductors and cables.		Pass
13.5.3	Rigid metal conduit and fittings	-	-
	Rigid metal conduit and fittings shall be of galvanized steel or of a corrosion-resistant material suitable for the conditions.		N/A
	The use of dissimilar metals in contact that can cause galvanic action should be avoided.		N/A
	Conduits shall be securely held in place and supported at each end.		N/A
	Fittings shall be compatible with the conduit and appropriate for the application. Fittings shall be threaded unless structural difficulties prevent assembly.		N/A
	Where threadless fittings are used, the conduit shall be securely fastened to the equipment.		N/A
	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/A
13.5.4	Flexible metal conduit and fittings	-	-
	A flexible metal conduit shall consist of a flexible metal tubing or woven wire armour. It shall be suitable for the expected physical environment.		N/A
	Fittings shall be compatible with the conduit and appropriate for the application.		N/A
13.5.5	Flexible non-metal conduit and fittings	-	-
	Flexible non-metallic conduit shall be resistant to kinking and shall have physical characteristics similar to those of the sheath of multiconductor cables.		Pass
	The conduit shall be suitable for use in the expected physical environment		Pass
	Fittings shall be compatible with the conduit and appropriate for the application.		Pass
13.5.6	Cable trunking systems	-	-

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Cable trunking systems external to enclosures shall be rigidly supported and clear of all moving or contaminating portions of the machine.		N/A
	Covers shall be shaped to overlap the sides; gaskets shall be permitted. Covers shall be attached to cable trunking systems by suitable means. On horizontal cable trunking systems, the cover shall not be on the bottom unless specifically designed for such installation. NOTE Requirements for cable trunking and ducting systems for electrical installations are given in the IEC 61084 series.		N/A
	Where the cable trunking system is furnished in sections, the joints between sections shall fit tightly but need not be gasketed.		N/A
	The only openings permitted shall be those required for wiring or for drainage. Cable trunking systems shall not have opened but unused knockouts.		N/A
13.5.7	Machines compartments and cable trunking systems	-	-
	The use of compartments or cable trunking systems within the column or base of a machine to enclose conductors is permitted provided the compartments or cable trunking systems are isolated from coolant or oil reservoirs and are entirely enclosed.		N/A
	Conductors run in enclosed compartments and cable trunking systems shall be so secured and arranged that they are not subject to damage.		N/A
13.5.8	Connection boxes and other boxes	-	-
	Connection boxes and other boxes used for wiring purposes shall be accessible for maintenance.		N/A
	Those boxes shall provide protection against the ingress of solid bodies and liquids, taking into account the external influences under which the machine is intended to operate (see 11.3).		N/A
13.5.9	Motor connection boxes	-	-
	Shall enclose only connections to the motor and motor-mounted devices		Pass
	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.		Pass
14	**Electric motors and associated equipment**	**-**	-
14.1	General requirements	-	-
	Electric motors should conform to the relevant parts of IEC 60034 series.		Pass
	The protection requirements for motors and associated equipment are given in 7.2 for overcurrent protection, in 7.3 for overload protection, and in 7.6 for overspeed protection.		Pass
	As many controllers do not switch off the supply to a motor when it is at rest, care shall be taken to ensure compliance with the requirements of 5.3, 5.4, 5.5, 7.5, 7.6 and 9.4.		N/A
	Motor control equipment shall be located and mounted in accordance with Clause 11.		Pass
14.2	Motor enclosures	-	-
	It is recommended that motor enclosures be chosen from those included in IEC 60034-5.		Pass
	The degree of protection shall be at least IP23 (see IEC		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	60529) for all motors. More stringent requirements can be needed depending on the application and the physical environment (see 4.4).		
14.3	Motor dimensions	-	-
	As far as is practicable, the dimensions of motors shall conform to those given in the IEC 60072 series.		Pass
14.4	Motor mounting and compartments	-	-
	Each motor and its associated couplings, belts, pulleys, or chains, shall be so mounted that they are adequately protected and are easily accessible for inspection, maintenance, adjustment and alignment, lubrication, and replacement.		Pass
	The motor mounting arrangement shall be such that all motor hold-down means can be removed and all terminal boxes are Accessible.		Pass
	Motors shall be so mounted that proper cooling is ensured and the temperature rise remains within the limits of the insulation class (see IEC 60034-1).		Pass
	Where practicable, motor compartments should be clean and dry, and when required, shall be ventilated directly to the exterior of the machine.		N/A
	The vents shall be such that ingress of swarf, dust, or water spray is at an acceptable level.		N/A
	There shall be no opening between the motor compartment and any other compartment that does not meet the motor compartment requirements.		Pass
	Where a conduit or pipe is run into the motor compartment from another compartment not meeting the motor compartment requirements, any clearance around the conduit or pipe shall be sealed.		Pass
14.5	Criteria for motor selection	-	-
	The characteristics of motors and associated equipment shall be selected in accordance with the anticipated service and physical environmental conditions (see 4.4). In this respect, the points that shall be considered include: -type of motor; -type of duty cycle (see IEC 60034-1); -fixed speed or variable speed operation, (and the consequent variable influence of the ventilation); -mechanical vibration; -type of motor control; -influence of the harmonic spectrum of the voltage and/or current feeding the motor (particularly when it is supplied from a static convertor) on the temperature rise; -method of starting and the possible influence of the inrush current on the operation of other users of the same power supply, taking also into account possible special considerations stipulated by the supply authority; -variation of counter -torque load with time and speed; -influence of loads with large inertia; -influence of constant torque or constant power operation; -possible need of inductive reactors between motor and converter.		Pass
14.6	Protective devices for mechanical brakes	-	-
	Operation of the overload and overcurrent protective devices for mechanical brake actuators shall initiate the simultaneous de-energization (release) of the		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	associated machine actuators. NOTE Associated machine actuators are those associated with the same motion, for example cable drums and long-travel drives.		
15	**Accessories and lightning**	**-**	-
15.1	Accessories	-	-
	Where the machine or its associated equipment is provided with socket-outlets that are intended to be used for accessory equipment (for example hand-held power tools, test equipment), the following apply: -the socket-outlets should conform to IEC 60309-1. Where that is not practicable, they should be clearly marked with the voltage and current ratings; -the continuity of the protective bonding circuit to the socket-outlet shall be ensured except where protection is provided by PELV; -all unearthed conductors connected to the socket-outlet shall be protected against overcurrent and, when required, against overload in accordance with 7.2 and 7.3 separately from the protection of other circuits; -where the power supply to the socket-outlet is not disconnected by the supply disconnecting device for the machine or the section of the machine, the requirements of 5.3.5 apply.		N/A
15.2	Local lighting of the machine and equipment	-	-
15.2.1	General	-	-
	Connections to the protective bonding circuit shall be in accordance with 8.2.2.	No lighting circuit is provided.	N/A
	The ON/OFF switch shall not be incorporated in the lampholder or in the flexible connecting cords.		N/A
	Stroboscopic effects from lights shall be avoided by the selection of appropriate luminaires		N/A
	Where fixed lighting is provided in an enclosure, electromagnetic compatibility should be taken into account using the principles outlined in 4.4.2.		N/A
15.2.2	Supply	-	-
	The nominal voltage of the local lighting circuit shall not exceed 250 V between conductors. A voltage not exceeding 50 V between conductors is recommended.		N/A
	Lighting circuits shall be supplied from one of the following sources (see also 7.2.6):		N/A
	-a dedicated isolating transformer connected to the load side of the supply disconnecting device. Overcurrent protection shall be provided in the secondary circuit;		N/A
	-a dedicated isolating transformer connected to the line side of the supply disconnecting device. That source shall be permitted for maintenance lighting circuits in control enclosures only. Overcurrent protection shall be provided in the secondary circuit (see also 5.3.5 and 13.1.3);		N/A
	-a machine circuit with dedicated overcurrent protection;		N/A
	-an isolating transformer connected to the line side of the supply disconnecting device, provided with a dedicated primary disconnecting means (see 5.3.5) and secondary overcurrent protection, and mounted within the control enclosure adjacent to the supply		N/A

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	disconnecting device (see also 13.1.3);		
	-an externally supplied lighting circuit (for example factory lighting supply). This shall be permitted in control enclosures only, and for the machine work light(s) where their total power rating is not more than 3 kW.		N/A
	Exception: where fixed lighting is out of reach of operators during normal operations, the provisions of this Subclause do not apply.		N/A
15.2.3	Protection	-	-
	Local lighting circuits shall be protected in accordance with 7.2.6.		N/A
15.2.4	Fittings	-	-
	Adjustable lighting fittings shall be suitable for the physical environment.		N/A
	The lampholders shall be: -in accordance with the relevant IEC standard; -constructed with an insulating material protecting the lamp cap so as to prevent unintentional contact.		N/A
	Reflectors shall be supported by a bracket and not by the lampholder. Exception: where fixed lighting is out of reach of operators during normal operation, the provisions of this Subclause do not apply.		N/A
16	**Marking, warning signs and reference designations**	**-**	-
16.1	General	-	-
	Warning signs, nameplates, markings, and identification plates shall be of sufficient durability to withstand the physical environment involved.		Pass
16.2.1	Warning signs	-	-
	Enclosures that do not otherwise clearly show that they contain electrical equipment that can give rise to a risk of electric shock shall be marked with the graphical symbol IEC 60417-5036 (DB:2002-10).	Graphical symbol according to related standard has been used for every electricity part.	Pass
	The warning sign shall be plainly visible on the enclosure door or cover.		Pass
	The warning sign may be omitted (see also 6.2.2 b)) for: -an enclosure equipped with a supply disconnecting device; -an operator-machine interface or control station; -a single device with its own enclosure (for example position sensor).	No warning sign provided on these points.	Pass
16.2.2	Hot surfaces hazard	-	-
	Where the risk assessment shows the need to warn against the possibility of hazardous surface temperatures of the electrical equipment, the graphical symbol IEC 60417-5041 (DB:2002-10) shall be used.		Pass
16.3	Functional identification	-	-
	Control devices, visual indicators, and displays (particularly those related to safety) shall be clearly and durably marked with regard to their functions either on or adjacent to the item.		Pass
	Such markings may be as agreed between the user and the supplier of the equipment (see Annex B). Preference should be given to the use of standard symbols given in IEC 60417DB:2002 and ISO 7000.		Pass
16.4	Marking of control equipment	-	-

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	Equipment (for example controlgear assemblies) shall be legibly and durably marked in a way that is plainly visible after the equipment is installed.		Pass
	A nameplate giving the following information shall be attached to the enclosure adjacent to each incoming supply: -name or trade mark of supplier; -certification mark, when required; -serial number, where applicable; -rated voltage, number of phases and frequency (if a.c.), and full-load current for each supply; -short-circuit rating of the equipment; -main document number (see IEC 62023).		Pass
	The full-load current shown on the nameplate shall be not less than the running currents for all motors and other equipment that can be in operation at the same time under normal conditions.		Pass
	Where only a single motor controller is used, that information may instead be provided on the machine nameplate where it is plainly visible.	Not applicable.	N/A
16.5	Reference designations	-	-
	All enclosures, assemblies, control devices, and components shall be plainly identified with the same reference designation as shown in the technical documentation.		Pass
17	**Technical documentation**	**-**	-
17.1	General	-	-
	The information necessary for installation, operation, and maintenance of the electrical equipment of a machine shall be supplied in the appropriate forms, for example, drawings, diagrams, charts, tables, instructions.		Pass
	The information shall be in an agreed language (see also Annex B).		Pass
	The information provided may vary with the complexity of the electrical equipment. For very simple equipment, the relevant information may be contained in one document, provided that the document shows all the devices of the electrical equipment and enables the connections to the supply network to be made.		Pass
17.2	Information to be provided	-	-
	The information provided with the electrical equipment shall include: a) A main document (parts list or list of documents); b) Complementary documents including: 1) a clear, comprehensive description of the equipment, installation and mounting, and the connection to the electrical supply(ies); 2) electrical supply(ies) requirements; 3) information on the physical environment (for example lighting, vibration, atmospheric contaminants) where appropriate; 4) overview (block) diagram(s) where appropriate; 5) circuit diagram(s); 6) information (as applicable) on: * programming, as necessary for use of the equipment; * sequence of operation(s); * frequency of inspection; * frequency and method of functional testing; * guidance on the adjustment, maintenance, and repair, particularly of the protective devices and circuits; * recommended spare		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	parts list; and * list of tools supplied. 7) a description (including interconnection diagrams) of the safeguards, interlocking functions, and interlocking of guards against hazards, particularly for machines operating in a co-ordinated manner; 8) a description of the safeguarding and of the means provided where it is necessary to suspend the safeguarding (for example for setting or maintenance), (see 9.2.4); 9) instructions on the procedures for securing the machine for safe maintenance; (see also 17.8); 10) information on handling, transportation and storage; 11) information regarding load currents, peak starting currents and permitted voltage drops, as applicable; 12) information on the residual risks due to the protection measures adopted, indication of whether any particular training is required and specification of any necessary personal protective equipment.		
17.3	Requirements applicable to all documentation	-	-
	Unless otherwise agreed between manufacturer and user: -the documentation shall be in accordance with relevant parts of IEC 61082; -reference designations shall be in accordance with relevant parts of IEC 61346; -instructions/manuals shall be in accordance with IEC 62079. -parts lists where provided shall be in accordance with IEC 62027, class B. NOTE See item 13 of Annex B.		Pass
	For referencing of the different documents, the supplier shall select one of the following methods: -where the documentation consists of a small number of documents (for example less than 5) each of the documents shall carry as a cross-reference the document numbers of all other documents belonging to the electrical equipment; or -for single level main documents only (see IEC 62023), all documents shall be listed with document numbers and titles in a drawing or document list; or -all documents of a certain level (see IEC 62023) of the document structure shall be listed, with document numbers and titles, in a parts list belonging to the same level.		Pass
17.4	Installation documents	-	-
	The installation documents shall give all information necessary for the preliminary work of setting up the machine (including commissioning). In complex cases, it may be necessary to refer to the assembly drawings for details.		Pass
	The recommended position, type, and cross-sectional areas of the supply cables to be installed on site shall be clearly indicated.		Pass
	The data necessary for choosing the type, characteristics, rated currents, and setting of the overcurrent protective device(s) for the supply conductors to the electrical equipment of the machine shall be stated (see 7.2.2).		Pass
	Where necessary, the size, purpose, and location of		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	any ducts in the foundation that are to be provided by the user shall be detailed (see Annex B).		
	The size, type, 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 (see Annex B).		Pass
	Where necessary, the diagram shall indicate where space is required for the removal or servicing of the electrical equipment.		Pass
	In addition, where it is appropriate, an interconnection diagram or table shall be provided. That diagram or table shall give full information about all external connections. Where the electrical equipment is intended to be operated from more than one source of electrica supply, the interconnection diagram or table shall indicate the modifications or interconnections required for the use of each supply.		Pass
17.5	Overview diagrams and function diagrams	-	-
	Where it is necessary to facilitate the understanding of the principles of operation, an overview diagram shall be provided. An overview diagram symbolically represents the electrical equipment together with its functional interrelationships without necessarily showing all of the interconnections. NOTE 1 Examples of overview diagrams can be found in IEC 61082 series. Function diagrams may be provided as either part of, or in addition to, the overview diagram.		Pass
17.6	Circuit diagrams	-	-
	A circuit diagram(s) shall be provided. This diagram(s) shall show the electrical circuits on the machine and its associated electrical equipment. Any graphical symbol not shown in IEC 60617-DB:2001 shall be separately shown and described on the diagrams or supporting documents. The symbols and identification of components and devices shall be consistent throughout all documents and on the machine.		Pass
	Where appropriate, a diagram showing the terminals for interface connections shall be provided. That diagram may be used in conjunction with the circuit diagram(s) for simplification. The diagram should contain a reference to the detailed circuit diagram of each unit shown.		Pass
	Switch symbols shall be shown on the electromechanical diagrams with all supplies turned off (for example electricity, air, water, lubricant) and with the machine and its electricalequipment ready for a normal start.		Pass
	Conductors shall be identified in accordance with 13.2.		Pass
	Circuits shall be shown in such a way as to facilitate the understanding of their function as well as maintenance and fault location. Characteristics relating to the function of the control devices and components which are not evident from their symbolic representation shall be included on the diagrams adjacent to the symbol or referenced to a footnote.		Pass
17.7	Operating manual	-	-
	The technical documentation shall contain an operating manual detailing proper procedures for set-up and use		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	of the electrical equipment. Particular attention should be given to the safety measures provided.		
	Where the operation of the equipment can be programmed, detailed information on methods of programming, equipment required, program verification, and additional safety procedures (where required) shall be provided.		Pass
17.8	Maintenance manual	-	-
	The technical documentation shall contain a maintenance manual detailing proper procedures for adjustment, servicing and preventive inspection, and repair. Recommendations on maintenance/service intervals and records should be part of that manual. Where methods for the verification of proper operation are provided (for example software testing programs), the use of those methods shall be detailed.		Pass
17.9	Parts list	-	-
	The parts list, where provided, shall comprise, as a minimum, information necessary for ordering spare or replacement parts (for example components, devices, software, test equipment, technical documentation) required for preventive or corrective maintenance including those that are recommended to be carried in stock by the user of the equipment.		Pass
18	Verification	-	-
18.1	General	-	-
	This part of IEC 60204 gives general requirements for the electrical equipment of machines.	-	-
	The extent of verification will be given in the dedicated product standard for a particular machine. Where there is no dedicated product standard for the machine, the verifications shall always include the items a), b) and f) and may include one or more of the items c) to e): a) verification that the electrical equipment complies with its technical documentation; b) in case of protection against indirect contact by automatic disconnection, conditions for protection by automatic disconnection shall be verified according to 18.2; c) insulation resistance test (see 18.3); d) voltage test (see 18.4); e) protection against residual voltage (see 18.5); f) functional tests (see 18.6).		Pass
	When these tests are performed, it is recommended that they follow the sequence listed above.		Pass
	When the electrical equipment is modified, the requirements stated in 18.7 shall apply.		Pass
	For tests in accordance with 18.2 and 18.3, measuring equipment in accordance with the EN 61557 series is applicable.	The test is in accordance with 18.2 and 18.3, and the result is acceptable.	Pass
	The results of the verification shall be documented.		Pass
18.2	Verification of conditions for protection by automatic disconnection of supply	-	-
18.2.1	General		
	The conditions for automatic disconnection of supply (see 6.3.3) shall be verified by tests.		Pass
	For TN-systems, those test methods are described in 18.2.2; their application for different conditions of		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	supply are specified in 18.2.3. For TT and IT systems, see IEC 60364-6-61.		
18.2.2	Test methods in TN-systems		
	Test 1 verifies the continuity of the protective bonding circuit. Test 2 verifies the conditions for protection by automatic disconnection of the supply.	-	-
	Test 1 Verification of the continuity of the protective bonding circuit The resistance of each protective bonding circuit between the PE terminal (see 5.2 and Figure 2) and relevant points that are part of each protective bonding circuit shall be measured with a current between at least 0,2 A and approximately 10 A derived from an electrically separated supply source (for example SELV, see 413.1 of IEC 60364-4-41) having a maximum no-load voltage of 24 V a.c. or d.c.. It is recommended not to use a PELV supply since such supplies can produce misleading results in this test. The resistance measured shall be in the expected range according to the length, the cross sectional area and the material of the related protective bonding conductor(s).		Pass
	Test 2 Fault loop impedance verification and suitability of the associated overcurrent protective device The connections of the power supply and of the incoming external protective conductor to the PE terminal of the machine, shall be verified by inspection. The conditions for the protection by automatic disconnection of supply in accordance with 6.3.3 and Annex A shall be verified by both: 1) verification of the fault loop impedance by: -calculation, or -measurement in accordance with A.4, and 2) confirmation that the setting and characteristics of the associated overcurrent protectivedevice are in accordance with the requirements of Annex A.	By end user	Pass
18.2.3	Application of the test methods for TN-systems		-
	Test 1 of 18.2.2 shall be carried out on each protective bonding circuit of a machine. When Test 2 of 18.2.2 is carried out by measurement, it shall always be preceded by Test 1. The tests that are necessary for machines of different status are specified in Table 9. Table 10 can be used to enable determination of the machine status.		Pass
18.3	Insulation resistance tests	-	-
	When insulation resistance tests are performed, the insulation resistance measured at 500 V d.c. between the power circuit conductors and the protective bonding circuit shall be not less than 1 MΩ¸. The test may be made on individual sections of the complete electrical installation.	Test voltage=500VDC. And the resistance is more than 1MΩ.	Pass
	If the electrical equipment of the machine contains surge protection devices which are likely to operate during the test, it is permitted to either: -disconnect these devices, or -reduce the test voltage to a value lower than the voltage protection level of the surge protection devices, but not lower than the peak value of the upper limit of the supply (phase to neutral) voltage.	No surge protection devices provided.	N/A
18.4	Voltage tests	-	-
	When voltage tests are performed, test equipment in accordance with IEC 61180-2 should be used.		Pass

EN 60204-1:2006/AC:2010			
Clause	**Requirement**	**Result**	**Verdict**
	The test voltage shall be at a nominal frequency of 50 Hz or 60 Hz.	50Hz	Pass
	The maximum test voltage shall have a value of twice the rated supply voltage of the equipment or 1 000 V, whichever is the greater. The maximum test voltage shall be applied between the power circuit conductors and the protective bonding circuit for a period of approximately 1 s. The requirements are satisfied if no disruptive discharge occurs.	1000V and 1s.	Pass
	Components and devices that are not rated to withstand the test voltage shall be disconnected during testing.		Pass
	Components and devices that have been voltage tested in accordance with their product standards may be disconnected during testing.		Pass
18.5	Protection against residual voltages	-	-
	Where appropriate, tests shall be performed to ensure compliance with 6.2.4.		Pass
18.6	Functional tests	-	-
	The functions of electrical equipment shall be tested.		Pass
	The function of circuits for electrical safety (for example earth fault detection) shall be tested.		Pass
18.7	Retesting	-	-
	Where a portion of the machine and its associated equipment is changed or modified, that portion shall be reverified and retested, as appropriate (see 18.1).		Pass
	Particular attention should be given to the possible adverse effects that retesting can have on the equipment (for example overstressing of insulation, disconnection/reconnection of devices).	No retesting required.	N/A

Functional test

S/N	Function	Requirement	result
1	Short circuit	Fuse disconnected or CB's automatic disconnected	CB's automatic disconnected

Earthing continuity test report

Manufacturer：Dongguan Humen SIBOASI Sports Machinery Factory

EUT：Ball machine

Test model：T5

Ratings：AC 110-220V 50Hz

Test Equipment：EXTECH ELECTRONICS

Withstanding Voltage/Arc/Insulation/Grounding Tester

Model: 7740

Test conditions：10A/50Hz

Date：18th Jan, 2016

Test Points	Diameter & length Of conductor	Test current (A)	Result-resistance (mΩ)
PE – Control Panel	1.5mm^2	10	13
PE – Electrical Box	1.5mm^2	10	25
PE – Power switch	1.5mm^2	10	25

Insulation resistance test report

Manufacturer：Dongguan Humen SIBOASI Sports Machinery Factory

EUT：Ball machine

Test model：T5

Ratings：AC 110-220V 50Hz

Test Equipment：EXTECH ELECTRONICS

Withstanding Voltage/Arc/Insulation/Grounding Tester

Model: 7740

Test conditions：10A/50Hz

Date：18th Jan, 2016

Test Point	Result (MΩ)
power circuit conductor L1 and the protective bonding circuit	66
power circuit conductor L2 and the protective bonding circuit	58
power circuit conductor L3 and the protective bonding circuit	76

Withstand voltage test report

Manufacturer：Dongguan Humen SIBOASI Sports Machinery Factory

EUT：Ball machine

Test model：T5

Ratings：AC 110-220V 50Hz

Test Equipment：EXTECH ELECTRONICS

Withstanding Voltage/Arc/Insulation/Grounding Tester

Model: 7740

Test conditions：10A/50Hz

Date：18th Jan, 2016

Test Point	Breakdown? (Yes/No)
power circuit conductor L1 and the protective bonding circuit	**No**
power circuit conductor L2 and the protective bonding circuit	**No**
power circuit conductor L3 and the protective bonding circuit	**No**

Noise test report

TABLE OF CONTENTS

Applicable standards

1. EN ISO 3746：Acoustics-Determination of sound power levels of noise sources using sound pressure－Survey method using an enveloping measurement surface over a reflecting plane.
2. EN ISO 11202：Acoustics－Noise emitted by machinery and equipment－Measurement of emission sound pressure levels at the work station and at other specified positions－Survey method in situ.
3. ISO/TR 11688-1：Acoustics－Recommended practice for the design of low-noise machinery and equipment－Part 1 ：Planning.

I. Test instrument

The sound level meter used in the noise measurement is TES1350A manufactured by TES Electrical Electronic Corp. with the following features：

- Portable with light weight ＆ easy operation.
- Measurement range from 35 to 130 dB（A）.
- Type 1 precision.
- With “F” ＆ ”S” detect mode in accordance with IEC 651 type 1.
- Built in A-weighting network.
- Equipped with a high prepolarized condenser microphone.
- With automatic ＆ manual display.
- DC output for level recorder.

II. Measurement method

The measurements of this test have been carried out by a hand-held sound level meter, and readings are taken by A-frequency weighting at each measuring position.

III. Test environment

The test was carried out in the location of machine inside the factory, and the background noise has been ensure that its measuring value is lower than that of machine.

IV. Test result

1. Background

   Reading value: 53.4 dB (A)

2. Operation position(full load condition)

Right ear	Left ear
63.5 dB	58.0dB

3. Sound power level (where the measuring value of sound pressure level exceeds 85 dB(A))

Position	1	2	3	4	5
Readings (dB (A))	-	-	-	-	-
Position	6	7	8	9	L_w
Readings (dB (A))	-	-	-	-	-

The following is the calculation formula of L_w (Sound power level):

$L_w = L_{pf} + 10 \times \log (S/S_o)$

- L_{pf} is the A-weighted or frequency bank surface sound pressure level
- S is the area of the measurement surface in square meters：20 m^2
- S_0 is 1 m^2

ANNEX: photo of the example

Test Model: T5

End of report