TEST REPORT

EN ISO 12100:2010
Safety of machinery - General principles for design
- Risk assessment and risk reduction
EN 60204-1:2018+A1:2025
Safety of machinery - Electrical equipment of machines –
Part 1: General requirements

Report reference No. ..... :	JAT25102402536MR-1
Tested by ..... :	Tanac
Approved by ..... :	Tim You
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Contents ..... :	130 pages

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Test specification

Standard ..... :	EN ISO 12100:2010 EN 60204-1:2018+A1:2025
Test procedure ..... :	Commissioned test

Procedure deviation ..... :	N.A.

Test item	
Description ..... :	Electric BIKES
Trademark ..... :	MACFOX
Model/Type reference ..... :	EL-X7,EL-X7LE,EL-X7L,EL-X7E,EL-M24,EL-M25,EL-M24E,EL-25E,X7LE
Rating ..... :	48V 250W 25KM/H

Test case verdicts

Test case does not apply to the test object.....:	N/A
Test item does meet the requirement.....:	P(Pass)
Test item does not meet the requirement.....:	F(Fail)

Testing

Date of receipt of test item …….....:	2025-10-11
Date(s) of performance of test.....:	From 2025-10-11 to 2025-10-19

Label:

Electric BIKES

Model: X7LE

Rating: 48V 250W 25KM/H

E-Link Technology Co., Ltd.

CE **MADE IN CHINA**

General remarks

This test report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

"(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.

Contents

Part I： EN ISO 12100:2010 test report and Risk assessment

1. Risk assessment

This risk assessment report is based on the methods in the EN ISO 12100:2010 and EN ISO 14121-2 standards, and the 4 factors S-A-G-W have been used for evaluating the level of risks.

S：Severity of possible harm

- S1：Slight（normally reversible）
- S2：Serious（normally irreversible）
- S3：Cause a few men die
- S4：Calamity or cause many men die

A：Frequency any duration of exposure

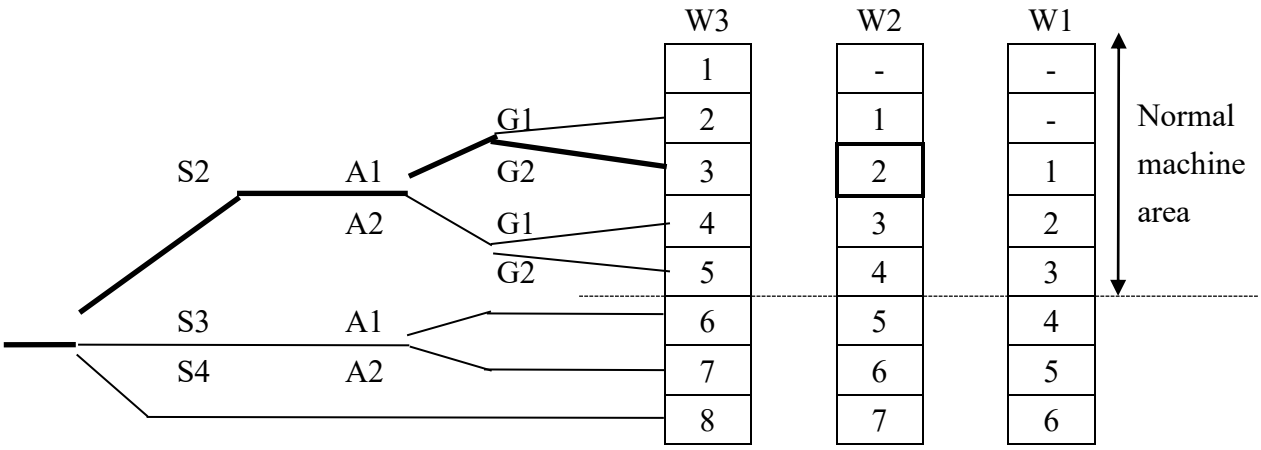
- A1：Seldom to very often
- A2：Frequent to continuous

G：Possibilities of avoidance

- G1：Possible
- G2：Impossible

W：Probability of occurrence of harm

- W1：Low
- W2：Medium
- W3：High



Solutions for the level of hazards

1：Protected by warning sign

2：Protected by guard and warning sign

3：Consider the other design, choose the best one, add both guard and warning sign

4：Consider another two design, choose the best one, add both guard and warning sign

5：Consider another three design, choose the best one, add both guard and warning sign

NO.	Hazards source	S	A	G	W	Level
Mechanical hazards						
1.0-1	Mechanical hazards due to machine parts or work pieces					
1.0-2	Mechanical hazards due to accumulation of energy inside the machinery					
1.1	Crushing	**2**	**1**	**1**	**2**	**1**
1.2	Shearing	**2**	**1**	**1**	**2**	**1**
1.3	Cutting or severing					
1.4	Entanglement					
1.5	Drawing-in or trapping					
1.6	Impact	**2**	**1**	**1**	**2**	**1**
1.7	Stabbing or puncture					
1.8	Friction or abrasion					
1.9	High pressure fluid injection or ejection					
Electrical hazards						
2.1	Contact with live parts	**2**	**1**	**1**	**2**	**1**
2.2	Contact with parts which have become live under faulty conditions	**2**	**1**	**1**	**2**	**1**
2.3	Approach to live part under high voltage					
2.4	Electrostatic phenomena					
2.5	Thermal radiation or other phenomena such as projection of molten particles and chemical effects form short-circuits, overloads etc.					
Thermal hazards						
3.1	Burns, scalds and other injuries by a possible contact of persons with objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources	**1**	**1**	**1**	**1**	**-**
3.2	Damage to health by hot or cold working environment					
Hazards generated by noise						
4.1	Hearing loss (deafness), other physiological disorders					
4.2	Interference with speech communication, acoustic signals, etc.					
Hazards generated by vibration						
5.1	Use of hand-help machines resulting in a variety of					

	neurological and vascular disorder					
5.2	Whole body vibration, particular when combined with poor postures					
Hazards generated by radiation						
6.1	Low frequency, radio frequency radiation, microwaves					
6.2	Infrared, visible and ultraviolet light					
6.3	X and gamma rays					
6.4	Alpha, beta rays, electron or ion beams, neutrons					
6.5	Lasers					
Hazards generated by materials and substances processed or used by the machinery						
7.1	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	**1**	**1**	**1**	**1**	**-**
7.2	Fire and explosion hazard					
7.3	Biological and micro-biological (viral or bacterial) hazards					
Hazards generated by neglecting ergonomic principles in machine design						
8.1	Unhealthy postures or excessive effort					
8.2	Inadequate consideration of hand-arm or foot-leg anatomy					
8.3	Neglected use of personal protection equipment					
8.4	Inadequate local lighting					
8.5	Mental overload or underload, stress					
8.6	Human error, human behavior	**1**	**1**	**1**	**1**	**-**
8.7	Inadequate design, location or identification of manual controls					
8.8	Inadequate design, location or identification of manual controls					
Combination of hazards						
9	Combination of hazards					
Unexpected start-up, unexpected overrun/over-speed						
10.1	Failure/disorder of the control system	**1**	**1**	**1**	**1**	**-**
10.2	Restoration of energy on supply after an interruption	**1**	**1**	**1**	**1**	**-**
10.3	External influences on electrical equipment	**1**	**1**	**1**	**1**	**-**
10.4	Other external influences (gravity, wind, etc.)					
10.5	Errors in the software					
10.6	Error made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)					

Impossibility of stopping the machine in the best possible conditions						
11	Impossibility of stopping the machine in the best possible conditions					
Variations in the rotational speed of tools						
12	Variations in the rotational speed of tools					
Failure of the power supply						
13	Failure of the power supply	**1**	**1**	**1**	**1**	**-**
Failure of the control circuit						
14	Failure of the control circuit	**1**	**1**	**1**	**1**	**-**
Errors of fitting						
15	Errors of fitting	**1**	**1**	**1**	**1**	**-**
Break-up during operation						
16	Break-up during operation					
Falling or ejected objects or fluids						
17	Falling or ejected objects or fluids	**1**	**1**	**1**	**1**	**-**
Loss of stability / overturning of machinery						
18	Loss of stability / overturning of machinery					
Slip, trip and fall of persons (related to machinery)						
19	Slip, trip and fall of persons(related to machinery)					
Additional hazards, hazardous situations and hazardous events due to mobility						
20	Relating to the traveling function					
20.1	Movement when starting the engine					
20.2	Movement without a driver at the driving position					
20.3	Movement without all parts in a safe position					
20.4	Excessive speed of pedestrian controlled machinery					
20.5	Excessive oscillations when moving					
20.6	Insufficient ability of machinery to be slowed down, stopped and immobilisated					
Linked to the work position (including driving station) on the machine						
21.1	Fall of persons during access to (or at/from) the work position					
21.2	Exhaust gases/lack of oxygen at the work position					
21.3	Fire（flammability of the cab, lack of extinguishing means）					
21.4	Mechanical hazards at the work position： contact with the wheels； rollover；					

	fall of objects, penetration by objects； break-up of parts rotation at high speed； contact of persons with machine parts or tools（pedestrian controlled machines）					
21.5	Insufficient visibility form the work positions					
21.6	Inadequate lighting					
21.7	Inadequate seating					
21.8	Noise at the work position					
21.9	Vibration at the work position					
21.10	Insufficient means for evacuation/emergency exit					
Due to the control system						
22.1	Inadequate location of manual controls					
22.2	Inadequate design of manual controls and their mode of operation					
Form handling the machine（lack of stability）						
23	Form handling the machine（lack of stability）					
Due to the power source and to the transmission of power						
24.1	Hazards form the engine and the batteries					
24.2	Hazards form the transmission of power between machines					
24.3	Hazards form coupling and towing					
Form/to third persons						
25.1	Unauthorized start-up/use	**1**	**1**	**1**	**2**	**-**
25.2	Drift of a part away from its stopping position					
25.3	Lack or inadequacy of visual or acoustic warning means					
Insufficient instructions for the driver/operator						
26	Insufficient instructions for the driver/operator	**1**	**1**	**1**	**1**	**-**
Additional hazards, hazardous situations and hazardous events due to lifting						
27	Mechanical hazards and hazardous events					
27.1	Form load falls, collisions, machine tipping caused by：					
27.1.1	Lack of stability					
27.1.2	Uncontrolled loading-overloading-overturning moments exceeded					
27.1.3	Uncontrolled amplitude of movements					
27.1.4	Unexpected/unintended movement of loads					
27.1.5	Inadequate holding devices/accessories					
27.1.6	Collision of more then one machine					

27.2	Form access of persons to load support					
27.3	Form derailment					
27.4	Form insufficient mechanical strength of parts					
27.5	Form inadequate selection of chains, ropes, lifting and accessories and their inadequate integration into the machine					
27.6	Form inadequate selection of chains, ropes, lifting and accessories and their inadequate integration into the machine					
27.7	Form lowering of the load under the control of friction brake					
27.8	Form abnormal conditions of assembly/testing/use/maintenance					
27.9	Form the effect of load on persons（impact by load or counterweight）					
Electrical hazards						
28.1	Form lightning					
Hazards generated by neglecting ergonomic principles						
29.1	Insufficient visibility from the driving position					
Additional hazards, hazardous and situations and hazardous events due to underground work						
30	Mechanical hazards and hazardous events due to:					
30.1	Lack of stability of powered roof supports					
30.2	Failing accelerator or brake control of machinery running on rails					
30.3	Failing or lack of dead man’s control of machinery running on rails					
31	Restricted movement of persons					
32	Fire and explosion					
33	Emission of dust, gases etc.					
Additional hazards, hazardous situations and hazardous events due to the lifting or moving of persons						
34	Mechanical hazards and hazardous events due to:					
34.1	Inadequate mechanical strength-inadequate working coefficients					
34.2	Failing of loading control					
34.3	Failing of controls in person carrier (function, priority)					
34.4	Over speed of person carrier					
35	Falling of person from person carrier					

36	Falling or overturning of person carrier					
37	Human error, human behavior					
NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
1.1	Crushing	**2**	**1**	**1**	**2**	**1**
Where	Moving parts					
When	approach of a moving element to a fixed part					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Affixing suitable warning signs. 2. Only operation by training/authorized persons. 3. Operation of the machine shall conform to the instructions of the instruction manual. 4. Check and inspection according to the specified durations of the instruction manual. 5. Provide guards.		**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
1.2	Shearing	**2**	**1**	**1**	**2**	**1**
Where	Moving parts					
When	approach of a moving element to a fixed part					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Affixing suitable warning signs. 2. Only operation by training/authorized persons. 3. Operation of the machine shall conform to the instructions of the instruction manual. 4. Check and inspection according to the specified durations of the instruction manual. 5. Provide guards.		**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
1.6	Impact	**2**	**1**	**1**	**2**	**1**

Where	The moving parts
When	access to the moving parts

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Affixing suitable warning signs. 2. Only operation by training/authorized persons. 3. Operation of the machine shall conform to the instructions of the instruction manual. 4. Check and inspection according to the specified durations of the instruction manual. 5. Provide guards.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
2.1	Contact with live parts	**1**	**1**	**1**	**1**	**-**
Where	Electrical cabinet, terminal boxes, control panels at machine					
When	contact with live parts or connections during commissioning, maintenance, trouble shooting					

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1.Only operation by training/authorized persons. 2.Operation of the machine shall conform to the instructions of the instruction manual. 3.Check and inspection according to the specified durations of the instruction manual. 4.Using safety components in accordance with those relevant international standards. 5.Use of warning label.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
2.2	Contact with parts which have become live under faulty conditions	**1**	**1**	**1**	**1**	**-**
Where	At machine or faulty part					
When	Contact with live parts or connections during operation, inspection and maintenance of machine					

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**

1. Only operation by training/authorized persons. 2. Operation of the machine shall conform to the instructions of the instruction manual. 3. Check and inspection according to the specified durations of the instruction manual. 4. Using safety components in accordance with those relevant international standards. 5.Use of warning label.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
3.1	Burns, scalds and other injuries by a possible contact of persons with objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources	**1**	**1**	**1**	**1**	**-**
Where	hot machine parts					
When	Contact with the parts					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Only operation by training/authorized persons. 2. Operation of the machine shall conform to the instructions of the instruction manual. 3. Using safety components in accordance with those relevant international standards. 4.Use of warning label.		**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
7.1	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	**1**	**1**	**1**	**1**	**-**
Where	At or near machine					
When	Conditions near machine caused by ejection of system.					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Only operation by training/authorized persons. 2. Operation of the machine shall conform to the instructions of the instruction manual.		**1**	**1**	**1**	**1**	**-**

3. Check and inspection according to the specified durations of the instruction manual. 4. Using safety components in accordance with those relevant international standards. 5.Use of warning label.					

NO.	Hazards source	S	A	G	W	Level
8.6	Human error, human behavior	2	1	1	1	1
Where	At load/unload, tool mounting positions					
When	Reasonably foreseeable misuse, inadvertent operation of controls, incorrect work material and cutter handling and setting during loading/ unloading, process control, tool handling.					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1.Only authorized person can use the machine. 2.Training before using this machine. 3.Make reference to the instruction manual before using this machine.		1	1	1	1	-

NO.	Hazards source	S	A	G	W	Level
10.1	Failure/disorder of the control system	1	1	1	1	-
Where	At machine					
When	Mechanical hazards associated with selected machine movement during setting,cleaning					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Only authorized person can use the machine. 2. Make reference to the instruction manual before using this machine. 3. Check before operation. 4. Periodic maintenance.		1	1	1	1	-

NO.	Hazards source	S	A	G	W	Level
10.2	Restoration of energy on supply after an interruption	1	1	1	1	-
Where	At or near machine					
When	Unexpected movements of machine during setting, cleaning or maintenance					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1.Only authorized person can use the machine.		1	1	1	1	-

2.Make reference to the instruction manual before using this machine. 3.Connection of protective earthing indeed. 4.Excellent electrical shielded housing. 5.Periodic maintenance.					

NO.	Hazards source	S	A	G	W	Level
10.3	External influences on electrical equipment	1	1	1	1	-
Where	At or near machine					
When	Unpredictable behaviour of electronic controls during setting or operating cycle of the machine.					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. All electrical equipments have been submitted to carry out the EMC testing according to relevant EN standards and get the CE E-mark. 2. Connection of protective earthing indeed. 3. Excellent electrical shielded housing.		**1**	**1**	**1**	**1**	**-**

NO.	Hazards source	S	A	G	W	Level
13	Failure of the power supply	1	1	1	1	-
Where	At machine where machine elements retained in a safe condition by the application of power or fluid pressure.					
When	Power workholding fails, motor overspeed.					
Improvement result						
Method		**S**	**A**	**G**	**W**	**Level**
1. Only authorized person can use the machine. 2.Make reference to the instruction manual before using this machine. 3.Check before operation. 4. Periodic maintenance.		**1**	**1**	**1**	**1**	**-**

NO.	Hazards source	S	A	G	W	Level
14	Failure of the control circuit	1	1	1	1	-

Where	At or near machine
When	Unexpected movements of machine during setting, cleaning or maintenance

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Checking before operation. 2. Make reference to the instruction manual before operate this machine. 3. Daily/periodic inspection and maintenance.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
15	Errors of fitting	**1**	**1**	**1**	**1**	**-**
Where	At machine					
When	machine parts fitted during tool mounting and maintenance					

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Only authorized person can use the machine. 2.Make reference to the instruction manual before using this machine. 3.Check before operation. 4. Periodic maintenance.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
17	Falling or ejected objects or fluids	**1**	**1**	**1**	**1**	**-**
Where	At or near machine					
When	on the stair					

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Only authorized person can use the machine. 2.Make reference to the instruction manual before using this machine. 3.Check before operation. 4. Periodic maintenance.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
25.1	Unauthorized start-up/use	**1**	**1**	**1**	**1**	**-**

Where	Control system
When	Operation, adjustment or maintenance of the machine

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Always starting the machine by training/authorized persons. 2. During adjustment or maintenance, put a warning nameplate near the working area. 3. Lock the power switch of the machine.	**1**	**1**	**1**	**1**	**-**

NO.	**Hazards source**	**S**	**A**	**G**	**W**	**Level**
26	Insufficient instructions for the driver/operator	**1**	**1**	**1**	**1**	**-**
Where	Whole machine					
When	Installation, assembly/disassembly, operation, adjustment or maintenance of the machine					

Improvement result					
Method	**S**	**A**	**G**	**W**	**Level**
1. Edit the instruction manual in conformity with those requirement of Machinery Directive and EN ISO 12100：2010 standard. 2. Each machine accompanied with a complete instruction manual.	**1**	**1**	**1**	**1**	**-**

2. EN ISO 12100:2010 part 6-7

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6	**Risk reduction**		**P**
6.1	General		P
	The objective of risk reduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk: -severity of harm from the hazard under consideration; - probability of occurrence of that harm. All protective measures intended for reaching this objective shall be applied in the following sequence, referred to as the three-step method (see also Figures 1 and 2).	Appropriate machine design has been performed by the manufacturer	P
6.2	Inherently safe design measures		P
6.2.1	General		P
	Inherently safe design measures are the first and most important step in the risk reduction process because protective measures inherent to the characteristics of the machine are likely to remain effective, whereas experience has shown that even well-designed safeguarding may fail or be violated and information for use may not be followed.	Appropriate machine design has been performed by the manufacturer.	P
	Inherently safe design measures are achieved by avoiding hazards or reducing risks by a suitable choice of design features of the machine itself and/or interaction between the exposed persons and the machine. 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).	Appropriate machine design has been performed by the manufacturer.	P
6.2.2	Consideration of geometrical factors and physical aspects		P
6.2.2.1	Geometrical factors		P
	Such factors include the following.		-

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	a) The form of machinery is designed to maximize direct visibility of the working areas and hazard zones from the control position — reducing blind spots, for example — and choosing and locating means of indirect vision where necessary (mirrors, etc.) so as to take into account the characteristics of human vision, particularly when safe operation requires permanent direct control by the operator, for example: -the travelling and working area of mobile machines; -the zone of movement of lifted loads or of the carrier of machinery for lifting persons; -the area of contact of the tool of a hand-held or hand-guided machine with the material being worked. The design of the machine shall be such that, from the main control position, the operator is able to ensure that there are no exposed persons in the danger zones.	Reducing blind spots	P
	b) The form and the relative location of the mechanical components parts: for instance, crushing and shearing hazards are avoided by increasing the minimum gap between the moving parts, such that the part of the body under consideration can enter the gap safely, or by reducing the gap so that no part of the body can enter it (see ISO 13854 and ISO 13857).	By increasing the minimum gap between the moving parts or by reducing the gap.	P
	c) Avoiding sharp edges and corners, protruding parts: in so far as their purpose allows, accessible parts of the machinery shall have no sharp edges, no sharp angles, no rough surfaces, no protruding parts likely to cause injury, and no openings which can “trap” parts of the body or clothing. In particular, sheet metal edges shall be deburred, flanged or trimmed, and open ends of tubes which can cause a “trap” shall be capped.	No sharp edges, no sharp angles, no rough surfaces, no protruding parts.	P
	d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).	Suitable working position,accessible manual controls.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6.2.2.2	Physical aspects		P
	Such aspects include the following:		-
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;	The actuating force has been limited to be a sufficiently low value.	P
	b)limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;		P
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing: 1) noise emission at source (see ISO/TR 11688-1), 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)], 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 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)].	Noise emission <85dB.	P
6.2.3	Taking into account the general technical knowledge regarding machine design		P
	This general technical knowledge can be derived from technical specifications for design (e.g. standards, design codes, calculation rules).These should be used to cover :		-

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	a) mechanical stresses such as - stress limitation by implementation of correct calculation, construction and fastening methods as regards, e.g. bolted assemblies, welded assemblies - stress limitation by overload prevention, (e.g. “fusible” plugs, pressure-limiting valve, breakage points, torque-limiting devices); - avoiding fatigue in elements under variable stresses (notably cyclic stresses); - static and dynamic balancing of rotating elements;	The appropriate technical knowledge of mechanical has been taken into account.	P
	b) materials and their properties such as - resistance to corrosion, ageing, abrasion and wear; - hardness, ductility, brittleness; - homogeneity; - toxicity; - flammability.	The materials have been treated by appropriate methods.	P
	c) emission values for : - noise; - vibration; - hazardous substances; - radiation.	Noise <85dB	P
	When the reliability of particular components or assemblies is critical for safety (e.g. ropes, chains, lifting accessories for lifting loads or persons), stress values shall be multiplied by appropriate working coefficients.	Appropriate working coefficients have been taken into account during design and calculation.	P
6.2.4	Choice of an appropriate technology		N
	One or more hazards can be eliminated or risks reduced by the choice of the technology to be used in certain applications, e.g. :		-
	a) on machines intended for use in explosive atmospheres: - fully pneumatic or hydraulic control system and machine actuators; - “intrinsically safe” electrical equipment (see IEC 60079-11)		N
	b) for particular products to be processed such as a solvent: equipment assuring that the temperature will remain far		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	below the flash point.		
	c) alternative equipment to avoid high noise level, e.g.: - electrical instead of pneumatic equipment - in certain conditions, water cutting instead of mechanical equipment.		N
6.2.5	Applying the principle of the positive mechanical action		N
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements. An example of this is positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119).		N
6.2.6	Provisions for stability		P
	Machines shall be designed to have sufficient stability to allow them to be used safely in their specified conditions of use.	These machines have been designed to have sufficient stability .	P
	Factors to be taken into account include		-
	- geometry of the base;	The factor has been taken into account during design.	P
	- weight distribution, including loading;	The factor has been taken into account during design.	P
	- dynamic forces due to movements of parts of the machine, of the machine itself, or of elements held by the machine which may result in an overturning moment;	The factor has been taken into account during design.	P
	- vibration	The factor has been taken into account during design.	P
	- oscillations of the centre of gravity;		N
	- characteristics of the supporting surface in case of traveling or installation on different sites (e.g. ground conditions, slope);	The factor has been taken into account during design.	P
	- external forces (e.g. wind pressure, manual forces)	The factor has been	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
		taken into account during design.	
	Stability shall be considered in all phases of the life of the machine, including handling, traveling, installation, use, de-commissioning and dismantling.	The factor has been taken into account during design.	P
	Other protective measures for stability relevant to safeguarding are given in 6.3.2.6	Please see the related clause.	P
6.2.7	Provision for maintainability		P
	When designing a machine, the following maintainability factors shall be taken into account:		-
	- accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used;	These factors have been taken into account during design.	P
	- ease of handling, taking into account human capabilities;	The factor has been taken into account during design.	P
	- limitation of the number of special tools and equipment;	The factor has been taken into account during design.	P
6.2.8	Observing ergonomic principles		P
	Ergonomic principles shall be taken into account in designing machinery to reduce mental or physical stress and strain of the operator.	Appropriate ergonomic principles have been taken into account in designing machinery.	P
	These principles shall be considered when allocating functions to operator and machine (degree of automation) in the basic design.	These principles have been taken into account during allocating functions to operator and machine.	P
	Account shall be taken of body sizes likely to be found in the intended user population, strengths and postures, movement amplitudes, frequency of cyclic actions (see ISO 10075 and ISO 10075-2)	All these factors have been taken into account during design.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	All elements of the “operator-machine” interface such as controls, signaling 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, ISO 6385, EN 13861 and IEC 61310-1)	All arrangement and design of manual controls have been checked in compliance with.	P
	Designer’s attention is especially drawn to following ergonomic aspects of machine design		-
	a) Avoiding stressful postures and movements during use of the machine (e.g. by providing facilities to adjust the machine to suit the various operators).	Stressful postures and movements during use of the machine have been avoided.	P
	b) Designing machines, and more especially hand-held and mobile machines to enable them to be operated easily taking into account human effort, actuation of controls and hand, arm and leg anatomy.	This machine has been adjusted to the human strength and convenient movement.	P
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatures.	This machine has been designed with low noise, vibration.	P
	d) Avoid linking the operator's working rhythm to an automatic succession of cycles.	This situation has been avoided.	P
	e) Providing 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 of the lighting source has to be adjusted, its location shall be such that it does not cause any risk to persons making the adjustment.		N
	f) Select, locate and identify manual controls (actuators) so that		-
	- they are clearly visible and identifiable and appropriately marked where necessary (see6.4.4)	Clearly visible and appropriately marked	P
	- they can be safely operated without hesitation or loss of time and without ambiguity (e.g. a standard layout of	Standard layout of	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	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)	controls. See the photos.	
	- their location(for push-buttons) and their movement (for levers and handwheels) are consistent with their effect (see IEC 61310-3)	Push-buttons are consistent with their effect.	P
	- their operation cannot cause additional risk		P
	Where a control is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence (e.g. keyboards), the action to be performed shall be clearly displayed and subject to confirmation where necessary.	one-to-one correspondence	N
	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.	Taking account of ergonomic principles	P
	Constraints due to the necessary or foreseeable use of personal protective equipment(such as footwear, gloves)shall be taken into account.	Gloves and shoes	P
	g) Select, design and locate indicators, dials and visual display units so that		-
	- they fit within the parameters and characteristics of human perception		P
	- information displayed can be detected, identified and interpreted conveniently, i.e. long lasting, distinct, unambiguous and understandable with respect to the operator's requirements and the intended use;	All the information displayed comply with this requirement.	P
	- the operator is able to perceive them form the control position		P
6.2.9	Preventing electrical hazard		P
	For the design of the electrical equipment of machines EN 60204-1 gives general provisions, especially in clause 6 for protection against electric shock.	See the test report of EN 60204-1	P
	For requirements related to specific machines, see corresponding IEC standards (e.g. series of IEC 61029, IEC 60745, IEC 60335).		N
6.2.10	Preventing and hydraulic hazards		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	Pneumatic and hydraulic equipment of machinery shall be designed so that :		-
	- the maximum rated pressure cannot be exceeded in the circuits (e.g. by means of pressure limiting devices)	By pressure limiting valve	P
	- no hazard results from pressure surges or rises, pressure losses or drops or losses of vacuum;	No hazard results	P
	- no hazardous fluid jet or sudden hazardous movement of the hose (whiplash)results from leakage or component failures;	No hazard results	P
	- air receivers, air reservoirs or similar vessels (e.g. in gas loaded accumulators) comply with the design rules for these elements;		N
	- air elements of the equipment, and especially pipes and hoses, be protected against harmful external effects;		P
	- as far as possible, reservoirs and similar vessels (e.g. in gas loaded accumulators)are automatically depressurized when isolating the machine from its power supply (see 6.3.5.4) and, if it is not possible, means are provided for their isolation, local depressurizing and pressure indication (see also ISO 14118:2000, clause 5)		N
	- all elements which remain under pressure after isolation of the machine from its power supply be provided with clearly identified exhaust devices, and a warning label drawing attention to the necessity of depressurizing those elements before any setting or maintenance activity on the machine. See also ISO 4413 and ISO4414	Warning label	P
6.2.11	Applying inherently safe design measures to control system		P
6.2.11.1	General		P
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061)	Inherently safe design measures to control system have applied.	P
	The correct design of machine control systems can avoid unforeseen and potentially hazardous machine behaviour.	Inherently safe design measures to control	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
		system have applied.	
	Typical causes of hazardous machine behavior are :		-
	- an unsuitable design or modification (accidental or deliberate) of the control system logic;	No this kind of hazard in this machine	N
	- a temporary or permanent defect or a failure of one or several components of the control system;		N
	- a variation or a failure in the power supply of the control system;	No this kind of hazard in this machine	N
	- inappropriate selection, design and location of the control devices;	No this kind of hazard in this machine	N
	Typical examples of hazardous machine behaviour are :		-
	- unintended/unexpected start-up(see ISO 14118)	No this kind of hazard in this machine	P
	- uncontrolled speed change;		N
	- failure to stop moving parts;		N
	- dropping or ejection of a mobile part of the machine or of a workpiece clamped by the machine;		P
	- machine action resulting from inhibition (defeating or failure) of protective devices	No this kind of hazard in this machine	N
	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.	See the related clause	P
	These principles and methods shall be applied singly or in combination as appropriate to the circumstances (see ISO 13849-1 and EN 60204-1and IEC 62061).	See the test report of EN 60204-1	P
	Control systems shall be designed to enable the operator to interact with the machine safely and easily; this requires one or several of the following solutions;	The operator interact with the machine safely and easily.	P
	- systematic analysis of start and stop conditions;	Systematic analysis have been applied.	P
	- provision for specific operating modes (e.g. start-up after normal stop, restart after cycle interruption or after emergency stop, removal of the workpieces contained in	Enough provisions have been provided.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	the machine, operation of a part of the machine in case of a failure of a machine element)		
	- clear display of the faults;		P
	- measures to prevent accidental generation of unexpected start commands (e.g. shrouded start device) likely to cause dangerous machine behaviour (see ISO 14118:2000, figure 1)	Main switch with lock and related devices are provided.	P
	- maintained stop commands(e.g. interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000, figure 1)	This requirement is complied with.	P
	An assembly of machines may be divided into several zones for emergency stopping, for stopping as a result of protective devices and/or for isolation and energy dissipation.		P
	The different zones shall be clearly defined and it shall be obvious which parts of the machine belong to which zone.		P
	Likewise it shall be obvious which control devices (e.g. emergency stop devices, supply disconnecting devices)and/or protective devices belong to which zone.	Only control zone	N
	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.		N
	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(e.g. range, speed, acceleration, deceleration, load capacity). Allowance shall be made for dynamic effects (e.g. the swinging of loads).		P
	For example:		-
	- the traveling speed of mobile pedestrian controlled machinery other than remote-controlled shall be compatible with walking speed.		N
	- the range, speed, acceleration and deceleration of movements of the person-carrier and carrying vehicle for lifting persons shall be limited to non-hazardous values, taking into account the total reaction time of the operator		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	and the machine.		
	- the range of movements of parts of machinery for lifting loads shall be kept within specified limits.		N
	When machinery is designed to use synchronously different elements which can also be used independently the control system shall be designed to prevent risks due to lack of synchronization.		N
6.2.11.2	Starting of internal power source/switching on an external power supply		P
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation. For example: -starting the internal combustion engine shall not lead to movement of a mobile machine; -connection to mains electricity supply shall not result in the starting of working parts of a machine. See EN 60204-1:2006, 7.5 (see also Annexes A and B).	Not result in the starting of working parts of a machine	P
6.2.11.3	Starting/stopping of a mechanism		P
	The primary action for starting or accelerating the movement of a mechanism should be performed by application or increase of voltage or fluid pressure, or, if binary logic elements are considered, by passage from state 0 to state 1(if state 1 represents the highest energy state)	This requirement has been taken into account during design.	P
	The primary action for stopping or slowing down should be performed by removal or reduction of voltage or fluid pressure, or, if binary logic elements are considered, by passage from state 1 to state 0 (if state 1 represents the highest energy state).	The type of stopping of this machine belongs to state 1 and state 0.	P
	When, in order for the operator to maintain permanent control of deceleration, this principle is not observed (e.g. 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 such situation exist.	N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6.2.11.4	Restart after power interruption		P
	If it may generate a hazard, the spontaneous restart of a machine when it is re-energized after power interruption shall be prevented (e.g. by use of a self-maintained relay, contactor or valve).		P
6.2.11.5	Interruption of power supply		P
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply. At least the following requirements shall be met:		P
	- the stopping function of the machinery shall remain;		P
	- all devices whose permanent operation is required for safety shall operation an effective way to maintain safety (e.g. locking, clamping devices, cooling or heating devices, power-assisted steering of self-propelled mobile machinery);		P
	- parts of machinery or workpieces and/or loads held by machinery which are liable to move as a result of potential energy shall be retained for the time necessary to allow them to be safely lowered.		N
6.2.11.6	Use of automatic monitoring		P
	Automatic monitoring is intended to ensure that a safety function(s) implemented by a protective measure do(es) 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 in such a way that hazards are generated.		P
	Automatic monitoring either detects a fault immediately or carries out periodic checks so that a fault is detected before the next demand upon the safety function.		P
	In either case, the protective measure can be initiated immediately or delayed until a specific event occurs (e.g. the beginning of the machine cycle.) The protective measures may be , e.g.:		P
	- the stopping of the hazardous process;		P
	- preventing the re-start of this process after the first stop		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	following the failure;		
	- the triggering of an alarm		P
6.2.11.7	Safety functions implemented by programmable electronic control systems		N
6.2.11.7.1	General		N
	A control system including programmable electronic equipment (e.g. programmable controllers) can be used to implement safety functions t machinery.		N
	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.		N
	The design of the programmable electronic control system shall be such that the probability of random hardware failures and the likelihood of systematic failures that can adversely affect the performance of the safety-related control function(s) are sufficiently low.		N
	Where a programmable electronic control system performs a monitoring function, the system behaviour on detection of a fault shall be considered (see also IEC 61508 series for further guidance)		N
	The programmable electronic control system should be installed and validated to ensure that the specified performance (e.g. safety integrity level (SIL) in IEC 61508 series) for each safety function has been achieved.		N
	Validation comprises testing an analysis (e.g. static, dynamic or failure analysis) to show that all parts interact correctly to perform the safety function and that unintended functions do not occur.		N
6.2.11.7.2	Hardware aspects		N
	The hardware (including e.g. sensors, actuators, logic solvers) shall be selected (and/or designed) and installed to meet both the functional and performance requirements of the safety function(s) to be performed, in particular, by means of :		N
	- architectural constraints (e.g. the configuration of the		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	system, its ability to tolerate faults, its behaviour on detection of a fault);		
	- selecting (and/or designing) equipment and devices with an appropriate probability of dangerous random hardware failure;		N
	-Incorporating measures and techniques within the hardware to avoid systematic failures and control systematic faults.		N
6.2.11.7.3	Software aspects		N
	The software (including internal operating software (or system software) and application software) shall be designed so as to satisfy the performance specification for the safety functions (see also IEC 61508-3)		N
	Application software		N
	Application software should not be re-programmable by the user.		N
	This may be achieved by use of embedded software in a non re-programmable memory (e.g. micro-controller, application specific integrated circuit (ASIC)		N
	When the application requires reprogramming by the user, the access o the software dealing with safety functions should be restricted e.g. by : - locks; - passwords for the authorized persons		N
6.2.11.8	Principles relating to manual control		P
	a) Manual control devices shall be designed and located according to the relevant ergonomic principles given in 6.2.8	See the photo.	P
	b) A stop control device shall be placed near each start control device. Where the start/stop function is performed by means of a hold-to-run control, a separate stop control device shall be provided when a risk can result from the hold-to-run control device failing to deliver a stop	A stop control device has been placed near each start control device.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	command when released.		
	c) Manual controls shall be located out of reach of the danger zones (see IEC 61310-3), except for certain controls where, of necessity, they are located within a danger zone, such as emergency stop or teach pendant.	Manual controls have been located out of reach of the danger zones.	P
	d) Whenever possible, control devices and control positions shall be located so that the operator is able to observe the working area or hazard zone.	The operator is able to observe the working area or hazard zone.	P
	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 a ride-on mobile machine	N
	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 for lifting persons.	N
	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 among others of a portable control unit (teach pendant, for instance), with which the operator may enter danger zones.		P
	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 and ISO 447)		P
	g) For machine functions whose safe operation depends on permanent, direct control by the operator, measures shall be taken to ensure the presence of the operator at the control position , e.g. by the design and location of control devices.		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	h) For cableless control an automatic stop shall be performed when correct control signals are not received, including loss of communication (see EN 60204-1)	No cableless control	N
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		N
	Where, for setting, teaching, process changeover, fault-finding, cleaning or maintenance of machinery, a guard has to 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 in operation, safety of the operator shall be achieved using a specific control mode which simultaneously:		N
	- disables all other control modes;		N
	- permits operation of the hazardous elements only by continuous actuation of an enabling device, a hold-to-run control device or a two-hand control device;		N
	- permits operation of the hazardous elements only in reduced risk conditions (e.g. reduced speed, reduced power/force, step-by-step operation, e.g. with a limited movement control device)		N
	prevents any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.		N
	This control mode shall be associated with one or more of following measures:		-
	- restriction of access to the danger zone as far as possible.		N
	- emergency stop control within immediate reach of the operator;		N
	- portable control unit (teach pendant) and/or local controls allowing sight of the controlled elements.(see EN 60204-1:2006, 9.2.4)		N
6.2.11.10	Selection of control and operating modes		N
	If machinery has been designed and built to allow for its		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	use in several control or operating modes requiring different protective measures and/or work procedures (e.g. to allow for adjustment , setting, maintenance, inspection), it shall be fitted with a mode selector which can be locked in each position.		
	Each position of the selector shall be clearly identifiable and shall exclusively allow one control or operating mode.		N
	The selector may be replaced by another selection means which restricts the use of certain functions of the machinery to certain categories of operators (e.g. access codes for certain numerically controlled functions).		N
6.2.11.11	Applying measures achieve electromagnetic compatibility (EMC)		N
	For guidance on electromagnetic compatibility, see EN 60204-1, and IEC 61000-6 series.		N
6.2.11.12	Provision of diagnostic systems to aid fault-finding		P
	Diagnostic systems to aid fault finding should be included in the control system so that there is no need to disable any protective measures.		P
6.2.12	Minimizing the probability of failure of safety functions		P
6.2.12.1	General		P
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine.The continued operation of the safety functions is essential for the safe use of the machine. This can be achieved by :		P
6.2.12.2	Use of reliable components		P
	“Reliable components” means components which are capable of withstanding all disturbances and stresses associated with the usage of the equipment in the conditions of intended use (including the environmental conditions), for the period of time or the number of operations fixed for the use, with a low probability of	Reliable components have been used.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	failures generating a hazardous malfunctioning of the machine. Components shall be selected taking into account all factors mentioned above(see also 6.213)		
6.2.12.3	Use of “oriented failure mode” components		P
	“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 such a failure leads to a non-hazardous alteration of the machine function.		P
	The use of such components should always be considered, particularly in cases where redundancy is (see 6.2.12.4) not employed.		P
6.2.12.4	Duplication (or redundancy) of components or subsystems		P
	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 other components) continue(s) to perform its (their) function, thereby ensuring that the safety function remains available.	No duplication (or redundancy) of components	N
	In order to allow the proper action to be initiated, component failure shall be preferably detected by automatic monitoring (see 6.2.11.6) or in some circumstances by regular inspection,	Be preferably detected by automatic monitoring	P
	provided that the inspection interval is shorter than the expected lifetime of the components.		P
	Diversity of design and/or technology can be used to avoid common cause failures (e.g. from electromagnetic disturbance) or common mode failures.		P
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 rectification, thereby reducing exposure to hazards.	This requirement is complied with.	P
	This applies to power systems (operative part) as well as to control systems, to safety functions as well as to other	This requirement is complied with.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	functions of machinery.		
	Safety-critical components (as e.g. certain sensors) with a known reliability shall be used.	Safety-critical components are used .	P
	The elements of guards and of protective services shall be particularly reliable, as their failure can expose persons to hazards, and also as poor reliability would encourage attempts to defeat them.		P
6.2.14	Limiting exposure to hazards through mechanization or automation of loading(feeding) /unloading (removal) operations		N
	Mechanization and automation of machine loading/unloading operations and more generally of handling operations (of workpieces, materials, substances) limit the risk generated by these operations by reducing the exposure of persons to hazards at the operating points.		N
	Automation can be achieved e.g. by robots, handling devices, transfer mechanisms, air blast equipment.		N
	Mechanization can be achieved, e.g. by feeding slides, push rods, hand-operated indexing tables.		N
	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 rectified.		N
	Care shall be taken to ensure that the use of these devices does not introduce further hazards (e.g. trapping, crushing) between the devices and parts of the machine or workpieces/materials being processed.		N
	Suitable safeguards (see 6.3) shall be provided if this cannot be ensured.		N
	Automatic feeding and removal devices with their own control systems and the control systems of the associated machine shall be interconnected after thoroughly studying how all safety functions are performed in all control and operation modes of the whole equipment.	Manual feeding	N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6.2.15	Limiting exposure to hazards through location of the setting and maintenance points outside of danger zones.		P
	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.		P
6.3	Safeguarding and complementary protective measures		P
6.3.1	General		P
	Guards and protective devices shall be used to protect persons whenever inherently safe design does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (e.g. emergency stop equipment) may have to be implemented.	Appropriate guards and protective devices have been used to protect persons	P
	Certain safeguards may be used to avoid exposure to more than one hazard (e.g. a fixed guard preventing access to a zone where a mechanical hazard is present being used to reduce noise level and collect toxic emissions)	fixed guard is used.	P
6.3.2	Selection and implementation of guards and protective devices		P
6.3.2.1	General		P
	This subclause gives guidelines for the selection and the implementation of guards and protective devices the primary purpose of which is to protect persons against hazard 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).	Please see the related clause.	P
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine.		P
	In selecting an appropriate safeguard for a particular type of machinery or hazard zone, it shall be borne in mind that a fixed guard is simple and shall be used where access of an operator to the danger zone is not required during		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	normal operation (operation without any malfunction) of the machinery.		
	As the need for frequency of access increase this inevitably leads to the fixed guard not being replaced.		P
	This requires the use of an alternative protective measure (movable interlocking guard, sensitive protective equipment.)		P
	A combination of safeguards may 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 may be required to protect against the secondary drawing-in or shearing hazard between the mechanical loading (feeding) device, when reachable, and the fixed guard.		N
	Consideration shall be given to the enclosure of control positions or intervention zones to provide combined protection against several hazards which may include:	This requirement has been taken in to consideration.	P
	- hazards from falling or ejected objects (e.g. falling object protection structure)		P
	- emission hazards (e.g. protection against noise, vibration, radiation , harmful substances)		P
	- hazards due to the environment (e.g. protection against heat, cold, foul weather)		P
	- hazards due to tipping over or rolling over of machinery (e.g. roll-over or tip-over protection structure)	No such hazards exist in this machine.	N
	The design of such enclosed work stations (e.g. cabs and cabins) shall take into account ergonomic principles concerning visibility, lighting, atmospheric conditions, access, posture.	No enclosed work stations.	N
6.3.2.2	Where access to the hazard zone is not required during normal operation		P
	Where access to the hazard zone is not required during		-

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	normal operation of the machinery, safeguard should be selected from the following:		
	a) fixed guard (see also ISO 14120)	Fixed guards are provided.	P
	b) interlocking guard with or without guard locking (see also 6.3.3.2.3, ISO 14119, ISO 14120);		N
	c) self-closing guard (see ISO 14120:2002, 3.3.2)		P
	d) sensitive protective equipment, e.g. electro-sensitive protective equipment (see IEC 61496) or pressure sensitive mat (see ISO 13856)		N
6.3.2.3	Where access to the hazard zone is required during normal operation		N
	Where access to the hazard zone is required during normal operation of the machinery , safeguards should be selected from the following:		-
	a) interlocking guard with or without guard locking (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this standard);		N
	b) sensitive protective equipment, e.g electro-sensitive protective equipment (see IEC 61496)		N
	c) adjustable guard;		N
	d) self-closing guard (see ISO 14120:2002, 3.3.2)		N
	e) two-hand control device (see ISO 13851)		N
	f) interlocking guard with a start function (control guard) (see 6.3.3.2.5 of this standard)		N
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault finding, cleaning or maintenance.		N
	As far as possible, machines shall be designed so that the safeguards provided for the protection of the production operator may ensure also the protection of personnel in charge of setting, teaching, process changeover, fault finding, cleaning or maintenance without hindering them in performing their task.		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	Such tasks shall be identified and considered in the risk assessment as parts of the use of the machine (see 5.2)		N
6.3.2.5	Selection and implementation of sensitive protective equipment		N
6.3.2.5.1	Selection		N
	Due to the great diversity of the technologies on which their detection function is based, all types of sensitive protective equipment are far from being equally suitable for safety applications.		N
	The following provisions are intended to provide the designer with criteria for selecting , for each application , the most suitable device(s).		N
	Types of sensitive protective equipment include, e.g.:		-
	- light curtains;		N
	- scanning devices as, e.g. laser scanners;		N
	- pressure sensitive mats;		N
	- trip bars, trip wires.		N
	Sensitive protective equipment can be used:		-
	- for tripping purposes;		N
	- for presence sensing;		N
	- for both tripping and presence sensing		N
	- to re-initiate machine operation, a practice which is subject to stringent conditions.		N
	The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:		N
	- tendency for the machinery to eject materials or component parts;		N
	- necessity to guard against emissions (noise, radiation, dust, etc.)		N
	- erratic or excessive machine stopping time;		N
	- inability of a machine to stop part-way through a cycle.		N
6.3.2.5.2	Implementation		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	consideration should be given to :		-
	a) - size, characteristics and positioning of the detection zone (see ISO 13855, which deals with the positioning of some types of sensitive protective equipment)		N
	b) - reaction of the device to fault conditions (see IEC 61496for electro-sensitive protective equipment)		N
	c)- possibility of circumvention		N
	d)- detection capability and its variation over the course of time (e.g. as a result of its susceptibility to different environmental conditions such as the presence of reflecting surfaces, other artificial light sources, sunlight or impurities in the air.		N
	sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that:		-
	- a command is given as soon as a person or part of a person is detected;		N
	- the withdrawal of the person or part of a person detected does not, by itself, restart the hazardous machine function (s); therefore, the command given by the sensitive protective equipment shall be maintained by the control system until a new command is given;		N
	- restarting the hazardous machine function(s) results from the voluntary actuation , by the operator, of a control device placed outside the hazard zone, where this zone can be observed by the operator;		N
	- the machine cannot operate during interruption of the detection function of the sensitive protective equipment, except during muting phases;		N
	- the position and the shape of detection field prevents, ,possibly together with fixed guards, a person or part of a person from entering the hazard zone, or being present in it, without being detected.		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6.3.2.5.3	Additional requirements for sensitive protective equipment when used for cycle initiation.		N
	In this exceptional application, starting of the machine cycle is initiated by the withdrawal of a person or of the detected part of a person from the sensing field of the sensitive protective equipment, without any additional start command, hence deviating from the general requirement given in the second point of the dashed list in 6.3.2.5.2, above. After switching on the power supply, or when the machine has been stopped by the tripping function of the sensitive protective equipment, the machine cycle shall be initiated only by voluntary actuation of a start control.		N
	Cycle initiation by sensitive protective equipment shall be subject to the following conditions:		-
	a) only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used;		N
	b) the requirements for an AOPD used as a tripping and presence-sensing device (see IEC 61496) are satisfied — in particular, location, minimum distance (see ISO 13855), detection capability, reliability and monitoring of control and braking systems;		N
	c) the cycle time of the machine is short and the facility to re-initiate the machine upon clearing of the sensing field is limited to a period commensurate with a single normal cycle;		N
	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;		N
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPD（s） is capable of cycle re-initiation;		N
	f) with regard to the higher risk resulting from automatic cycle initiation, the AOPD and the associated control		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	system comply with a higher safety-related performance than under normal conditions.		
6.3.2.6	Protective measures for stability		P
	If stability cannot be achieved by inherently safe design measures such as weight distribution (see 4.6), it will be necessary to maintain it by protective measures such as the use of :		P
	- anchorage bolts;		P
	- locking devices;		N
	- movement limiters or mechanical stops;		N
	- acceleration or deceleration limiters;		N
	- load limiters;		N
	- alarms warning of the approach to stability or tipping limits;		N
6.3.2.7	Other protective devices		N
	When a machine requires continuous control by the operator(e.g. mobile machines, cranes) and an error of the operator can generate a hazardous situation, this machine shall be equipped with the necessary devices to enable the operation to remain within specified limits , in particular:		N
	- when the operator has insufficient visibility of the hazard zone;		N
	- when the operator lacks knowledge of the actual value of a safety –related parameter (e.g. .a distance, a speed, the mass of a load, the angle of a slope)		N
	- when hazards may result from operations other than those controlled by the operator;		N
	The necessary devices include:		-
	- devices for limiting parameters of movement (distance, angle, velocity , acceleration)		N
	- overloading and moment limiting devices:		N
	- devices to prevent collisions or interference with other machines;		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	-device for preventing hazards to pedestrian operators of mobile machinery or other pedestrians;		N
	- torque limiting devices, breakage points to prevent excessive stress of components and assemblies;		N
	- devices for limiting pressure, temperature;		N
	- devices for monitoring emissions;		N
	- devices prevent operation in the absence of the operator at the control position;		N
	- device to prevent lifting operations unless stabilizers are in place;		N
	- devices to limit inclination of the machine on a slope;		N
	- devices to ensure that components are in a safe position before traveling;		N
	Automatic protective measures triggered by such devices which take operation of the machinery out of the control of the operator (e.g. automatic stop of hazardous movement) should be preceded or accompanied by a warning signal to enable the operator to take appropriate action (see 6.4.3)		N
6.3.3	Requirements for the design of guards and protective devices		P
6.3.3.1	General requirements		P
	Guards and protective devices shall be designed to be suitable for the intended use, taking into account mechanical and other hazards involved. Guards and protective devices shall be compatible with the working environment of the machine and designed so that they cannot be easily defeated. They shall provide the minimum possible interference with activities during operation and other phases of machine life, in order to reduce any incentive to defeat them.	Guards and protective devices have been appropriately designed.	P
	Guards and protective devices shall :		-
	- be of robust construction.	Steel	P
	- not give rise to any additional hazard;	No additional hazard	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	- not be easy to by-pass or render non-operational;	Not be easy to by-pass	P
	- be located at an adequate distance from the danger zone (see ISO 13857 and ISO 13855).	an adequate distance from the danger zone	P
	- cause minimum obstruction to the view of the production process;		P
	- enable essential work to be carried out on installation and/or replacement of tools and also for maintenance by allowing access only to the area where the work has to be done, if possible without the guard or protective device having to be moved;		P
	For openings in the guards see ISO 13857		P
6.3.3.2	Requirements for fixed guards		P
6.3.3.2.1	Functions of guards		P
	The functions that guards can achieve are:		P
	- prevention of access to the space enclosed by guard and/or - containment/capture of materials, workpieces, chips, liquids which may be ejected or dropped by the machine and reduction of emissions(noise, radiation, hazardous substances such as dust, fumes, gases) which may be generated by the machine.	The space enclosed. Containment of workpieces, chips, liquids which may be ejected by the machine	P
	Additionally, they may need to have particular propertied relating to electricity, temperature, fire, explosion, vibration, visibility(see ISO 14120) and operator position ergonomics(e.g. usability, operator's movements, posture, repetitive movements).		P
6.3.3.2.2	Requirements for fixed guards		P
	Fixed guards shall be securely held in place:		-
	- either permanently (e.g. by welding) - or by means of fasteners (screws, nuts) making removal/opening impossible without using tools; they should not remain closed without their fasteners (see ISO 14120)	All the fixed guards are securely held in place by appropriate fasteners.	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
6.3.3.2.3	Requirements for movable guards		P
	a) movable guards which provide protection against hazards generated by moving transmission parts shall :		-
	- as far as possible remain fixed to the machinery or other structure (generally by means of hinges or guides) when open;	by means of hinges	P
	- be interlocking guards (with guard locking when necessary) (see ISO 14119)		P
	b) movable guards against hazards generated by non-transmission moving parts shall be designed and associated with the machine control system so that:		-
	- 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 ; this can be achieved by interlocking guards, with guard locking when necessary.		P
	- they can be adjusted only by an intentional action , such as the use of a tool or a key;		N
	- the absence or failure of one of their components prevents starting of the moving parts or stops them; this can be achieved by automatic monitoring (see 4.11.6)		P
6.3.3.2.4	Requirements for adjustable guards	No adjustable guards	N
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed;		N
	They shall :		-
	- be designed so that the adjustment remains fixed during a given operation;		N
	- be readily adjustable without the use of tools;		N
6.3.3.2.5	Requirements for interlocking guards with a start function (control guards)		N
	An interlocking guard with a start function may be used provided that		-
	- all requirements for interlocking guards are satisfied (see ISO 14119)		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	- the cycle time of the machine is short		N
	- the maximum opening time of the guard is present to a low value (e.g. equal to the cycle time). When this time is exceeded, the hazardous function(s) cannot be initiated by the closing of the interlocking guard with a start function and resetting is necessary before restarting the machine.		N
	- the dimensions or shape of the machine do not allow a person, or part of a person, to stay in the hazard zone or between the hazard zone and the guard while the guard is closed (see ISO 14120)		N
	- all other guards whether fixed (removable type) or movable are interlocking guards;		N
	- the interlocking device associated with the interlocking guard with a start function is designed in such a way – e.g. by duplication of position detectors and use of automatic monitoring (see 4.11.6)- that its failure cannot lead to an unintended/unexpected start-up;		N
	- the guard is securely held open (e.g. by a spring or counterweight)such that it cannot initiate a start while falling by its own weight;		N
6.3.3.2.6	Hazards from guards		P
	Care shall be taken to prevent hazards which might be generated by :		-
	- the guard construction (e.g. sharp edges or corners, material);	No harp edges and corners.	P
	- the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall)		P
6.3.3.3	Technical characteristics of protective devices		P
	Protective devices shall be selected or designed and connected to the control system so as to ensure correct implementation of their safety function (s) is ensured.		P
	Protective devices shall be selected on the basis of their		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	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.		
	Protective devices shall be installed and connected to the control system so that they cannot be easily defeated.		P
6.3.3.4	Provisions for alternative types of safeguards.		P
	Provisions should be made to facilitate the fitting of alternative types of safeguards on machinery where it s known that this fitting will be necessary because the work to be done on it will vary.		P
6.3.4	Safeguarding for reducing emissions		P
6.3.4.1	General		
	If the measures for the reduction of emissions at source mentioned in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).		P
6.3.4.2	Noise		P
	Additional protective measures include, for example: - enclosures (see ISO 15667) - screens fitted to the machine; - silencers (see ISO 14163)	Enclosures	P
6.3.4.3	Vibration		P
	Additional protective measures include, for example, damping devices for vibration isolation between the source and the exposed person such as resilient mounting or suspended seats.		P
	For measures for vibration isolation of stationary industrial machinery see EN 1299		P
6.3.4.4	Hazardous substances		N
	Additional protective measures include, for example:		-
	- encapsulation of the machine (enclosure with negative pressure);		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	- local exhaust ventilation with filtration.		N
	- wetting with liquids;		N
	- special ventilation in the area of the machine (air curtains , cabins for operators)		N
6.3.4.5	Radiation		N
	Additional protective measures include, for example:		-
	- use of filtering and absorption;		N
	- use of attenuating screens or guards		N
6.3.5	Complementary protective measures		N
6.3.5.1	General		N
	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices), nor information for use may 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 , the ones dealt with in 6.3.5.2 to 6.3.5.6		N
6.3.5.2	Components and elements to achieve the emergency stop function		N
	If following a risk assessment, a machine needs to be fitted with components and elements to achieve an emergency stop function to enable actual or impending emergency situations to be averted, the following requirements apply:		-
	- the actuators shall be clearly identifiable, clearly visible and readily accessible		N
	- the hazardous process shall be stopped as quickly as possible without creating additional hazards . If this is not possible or the risk cannot be reduced, it should be questioned whether implementation of an emergency stop function is the best solution;		N
	- the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	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.		N
	This reset shall be possible only at that location where the emergency stop command has been initiated.The reset of the device shall not restart the machinery , but only permit restarting.		N
	More details for the design and selection of electrical components and elements to achieve the emergency stop function are provided in EN 60204 series.		N
6.3.5.3	Measures for the escape and rescue of trapped persons		P
	Measures for the escape and rescue of trapped persons may consist e.g. of :		-
	- escape routes and shelters in installations generating operator-trapping hazards		P
	- arrangements for moving some elements by hand, after an emergency stop		P
	- arrangements for reversing the movement of some elements		P
	- anchorage points for descender devices;		N
	- means of communication to enable trapped operators to call for help		N
6.3.5.4	Measures for isolation and energy dissipation		P
	Especially with regard to their maintenance and repair , machines shall be equipped with the technical means to achieve the isolation from power supply(ies) and dissipation of stored energy as a result of following actions:		P
	a) isolating (disconnecting, separating) the machine (or defined parts of the machine) from all power supplies;		P
	b) locking (or otherwise securing) all the isolating units in the isolating position;		P
	c) dissipating or , if this is not possible or practicable,		N

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	restraining (containing) any stored energy which may give rise to a hazard;		
	d) verifying, by means of a safe working procedure, that the actions taken according to a), b) and c) above have produced the desired effect.		P
	See ISO 14118:2000, clause 5 and EN 60204-1:2006, 5.5 and 5.6	See the test report of EN 60204-1.	P
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts		P
	Machines and their component parts which cannot be moved or transported by hand shall be provided or capable of being provided with suitable attachment devices for transport by means of lifting gear.	Provided with suitable attachment devices for transport by means of lifting gear.	P
	These attachments may be, among others,		-
	- standardized lifting appliances with slings, hooks, eyebolts, or tapped holes for appliance fixing;	Hooks, eyebolts	P
	- appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground.		N
	- guiding grooves for machines to be transported by a fork truck;		N
	- lifting gear and appliances integrated into the machine.		N
	Parts of machinery which can be removed manually in operation shall be provided with means for their safe removal and replacement; See also 6.4.4c)（ item 3).	Not removed manually in operation	N
6.3.5.6	Measures for safe access to machinery		P
	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.		P
	Where this is not possible, machines shall have built-in platforms, stairs or other facilities to provide safe access for those tasks, but care should be taken to ensure that such platforms or stairs do not give access to danger zones of		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	machinery.		
	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, suitable guard-rails (see ISO 14122-3) shall be provided.		N
	In large automated installations, particular attention shall be given to safe means of access such as walkways, conveyor bridges or crossover points.		N
	Means of access to parts of machinery located at a height shall be provided with collective means of protection against falls (e.g. guard-rails for stairways, stepladders and platforms and/or safety cages for ladders)		P
	As necessary , anchorage points for personal protective equipment against falls from a height shall also be provided (e.g. in carriers of machinery for lifting persons or with elevating control stations)		N
	Openings shall whenever possible open towards a safe position. They shall be designed to prevent hazards due to unintended opening.		P
	The necessary aids for access shall be provided (e.g. steps, handholds). Control devices shall be designed and located to prevent their being used as aids for access.		N
	When machinery for lifting goods and/or persons includes landings at fixed levels, these shall be equipped with interlocking guards preventing falls when the platform is not present at the level.	Not lifting machinery	N
	Movement of the lifting platform shall be prevented while the guards are open.	Not lifting platform	N
	For detailed provisions see ISO 14122.		N
6.4	Information for use		P
6.4.1	General requirements		P
6.4.1.1	Drafting information for use is an integral part of the design of a machine (see figure 2).		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	Information of use consists of communication links, such as texts, words, signs, signals, symbols or diagrams, used separately or in combination to convey information to the user. It is directed to professional and/or non-professional users.		P
6.4.1.2	Information shall be provided to the user about the intended use of the machine, taking into account, notably, all its operating modes.	See the instruction	P
	The information shall contain all directions required to ensure safe and correct use of the machine. With this in view, it shall inform and warn the user about residual risk.	See the instruction	P
	The information shall indicate, as appropriate,		-
	- the need for training,	See the instruction	P
	- the need for personal protective equipment,	shoes, glove.	P
	- the possible need for additional guards or protective devices (see Figure 2, Footnote d).	See the instruction	P
	It shall not exclude uses of the machine that can reasonably be expected from its designation and description and shall also warn about the risk which would result from using the machine in other ways than the ones described in the information, especially considering its reasonably foreseeable misuse.	See the instruction	P
6.4.1.3	Information for use shall cover, separately or in combination, transport, assembly and installation, commissioning, use of the machine (setting, teaching/programming or process changeover, operation, cleaning, fault-finding and maintenance) and, if necessary, dismantling, disabling and scrapping.	See the instruction	P
6.4.2	Location and nature of the information for use		P
	Depending on the risk , the time when the information is needed by the user and the machine design , it shall be decided whether the information – or parts thereof – are to be given:		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	- in /on the machine itself (see 6.3 and 6.4.4)	Adequate information is stated in the machine itself.	P
	- in accompanying documents (in particular instruction handbook , see 6.4.5)	See the instruction	P
	- on the packaging	Adequate information is stated on the packaging	P
	- by other means such as signals and warnings outside the machine.	Signals and warnings outside the machine.	P
	Standardized phrases shall be considered where important messages such as warnings need to be given (see also IEC 62079)		P
6.4.3	Signals and warning devices		P
	Visual signals (e.g. flashing lights) and audible signals (e.g. sirens) may be used to warn of an impending hazardous event such as machine start-up or overspeed.	Signals and warning devices are provided.	P
	Such signals may also be used to warn the operator before the triggering of automatic protective measures (see last paragraph of 5.2.7)	Please the related clause.	P
	It is essential that these signals:		-
	- be emitted before the occurrence of the hazardous event; - be unambiguous; - be clearly perceived and differentiated from all other signals used; - be clearly recognized by the operator and other persons.	Unambiguous, clearly perceived, clearly recognized	P
	The warning devices shall be designed and located such that checking is easy.		P
	The information for use shall prescribe regular checking of warning devices.		P
	The attention of designers is drawn to the risks from “sensorial saturation” which results from too many visual and/or acoustic signals, which may also lead to defeating		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	the warning devices.		
6.4.4	Markings, signs (pictograms), written warnings		P
	Machinery shall bear all markings which are necessary:		-
	a) for its unambiguous identification, at least :		-
	- name and address of the manufacturer; - designation of series or type; - serial number, if any.		P
	b) in order to indicate its compliance with mandatory requirements; - marking; - written indications (e.g. for machines intended for use in potentially explosive atmosphere)		P
	c) for its safe use, e.g. :		-
	- maximum speed of rotating parts;		P
	- maximum diameter of tools;		P
	- mass (expressed in kilograms) of the machine itself and/or of removable parts		P
	- maximum working load;		N
	-necessity of wearing personal protective equipment;	Gloves,shoes	P
	- guard adjustment data;		N
	- frequency of inspection.	See the instruction	P
	Information printed directly on the machine should be permanent and remain legible throughout the expected life of the machine.	Permanent and remain legible	P
	Signs or written warnings only saying “danger” shall not be used.		P
	Markings, signs and written warnings shall be readily understandable and unambiguous, especially as regards the part of the function(s) of the machine which they are related to.		P
	Readily understandable signs (pictograms) should be used in preference to written warnings.		P
	Signs and pictograms should only be used if they are		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	understood in the culture in which the machinery is to be used.		
	Markings shall comply with recognized standards (see ISO 2972, ISO 7000, particularly for pictograms, symbols , colours) See EN 60204 series as regards marking of electrical equipment.	All the markings are standard.	P
6.4.5	Accompanying documents (in particular, instruction handbook)		P
6.4.5.1	Contents		P
	The instruction handbook or other written instructions (e.g. on the packaging) shall contain among others:		-
	a) information relating to transport, handling and storage of the machine e.g. : -storage conditions for the machine; -dimensions , mass value(s), position of the centre (s) of gravity; -indications for handling (e.g. drawings indicating application points for lifting equipment)	All the related information is stated in the instruction handbook	P
	b) information relating to installation and commissioning of the machine, e.g. -fixing/anchoring and vibration dampening requirements; -assembly and mounting conditions; -space needed for use and maintenance; -permissible environmental conditions (e.g. temperature, moisture, vibration, electromagnetic radiation); -instructions for connecting the machine to power supply (particularly about protection against electrical overloading); -advice about waste removal /disposal; -if necessary, recommendations about protective measures which have to be taken by the user; e.g.	All the related information is stated in the instruction handbook	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	additional safeguards, safety distances, safety signs and signals.		
	c) information relating to the machine itself, e.g. : - detailed description of the machine, its fittings, its guards and/or protective devices; - 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. - diagrams (especially schematic representation of safety functions); - data about noise and vibration generated by the machine, about radiation , gases, vapours, dust emitted by it, with reference to the measuring methods used. - technical documentation about electrical equipment (see EN 60204 series) - documents attesting that the machine complies with mandatory requirements;	All the related information is stated in the instruction handbook	P
	d) information relating to the use of the machine, e.g. about: - intended use; - description of manual controls (actuators); - setting and adjustment; - modes and means for stopping (especially emergency stop) - risks which could not be eliminated by the protective measures taken by the designer; - particular risks which may be generated by certain applications, by the use of certain fittings, and about specific safeguards which are necessary for such applications. - reasonably foreseeable misuse and prohibited usages; - fault identification and location , repair, and re-starting	All the related information is stated in the instruction handbook	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	after an intervention; - personal protective equipment which need to be used and training required.		
	e) information for maintenance e.g. - nature and frequency of inspections for safety functions; - instructions relating to maintenance operations which require a definite technical knowledge or particular skills and hence should be carried out exclusively by skilled persons (e.g. maintenance staff, specialists) -instructions relating to maintenance actions (e.g. replacement of parts) which do not require specific skills and hence may be carried out by users (e.g. operators) - drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks)	All the related information is stated in the instruction handbook	P
	f) information relating to de-commissioning , dismantling and disposal;	See the instruction handbook	P
	g) information for emergency situations , e.g. : - type of fire-fighting equipment to be used. - warning about possible emission or leakage of harmful substance(s), and if possible, indication of means to fight their effects.		N
	h) maintenance instructions provided for skilled persons (second dash in e))and maintenance instructions provided for unskilled persons (third dash in e)), that should appear clearly separated from each other.	All the related information is stated in the instruction handbook	P
6.4.5.2	Production of the instruction handbook		P
	a) type and size of print shall ensure the best possible legibility. Safety warnings and/or cautions should be emphasized the use of colours, symbols and/or large print.	Legibility.	P
	b) 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.	English	P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	If more than one language are to be used, each language should be readily distinguished from the other(s), and efforts should be made to keep the translated text and the relevant illustration together.		
	c) whenever helpful to the understanding, text should be supplemented with written details enabling , for instance, manual controls (actuators) to be located and identified; they should not be separated from the accompanying text and should follow sequential operations.	See the Instruction handbook.	P
	d)consideration should be given to presenting information in tabular form where this will aid understanding. Tables should be adjacent to the relevant text.	See the Instruction handbook.	P
	e) the use of colours should be considered, particularly in relation to components requiring quick identification.		N
	f) when information for use is lengthy, a table of contents and/or an index should be given.		P
	g) safety-relevant instructions which involve immediate action should be provided in a form readily available to the operator.		P
6.4.5.3	Drafting and editing information for use		P
	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).	See the difference between the models	P
	b) communicate principles : when information for use is being prepared, the communication process “see-think-use” should be followed in order to achieve the maximum effect and should follow sequential operations. The questions “how ?” and “why ?” should be anticipated and the answers provided.		P
	c) information for use shall be as simple and as brief as possible, and should be expressed in consistent terms and units with a clear explanation of unusual technical terms.		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	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 users. If personal protective equipment is required for the safe use of the machine, clear advice should be given, e.g. on the packaging as well as on the machine, so that this information is prominently displayed at the point of sale.	Not for non-professional use	N
	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 may be useful to mark them “keep for future reference”. Where information for use is kept in electronic form (e.g. CD, DVD, tape) information on safety-related issues that need immediate action shall always be backed up with a hand copy that is readily available.	Kept in electronic form	P
7	Documentation of risk assessment and risk reduction		P
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation of		-
	a) the machinery for which the risk assessment has been made (for example, specifications, limits, intended use);		P
	b) any relevant assumptions that have been made (loads, strengths, safety factors, etc.);		P
	c) the hazards and hazardous situations identified and the hazardous events considered in the risk assessment;		P
	d) the information on which risk assessment was based (see 5.2):		-
	1) the data used and the sources (accident histories, experience gained from risk reduction applied to similar machinery, etc.);		P
	2) the uncertainty associated with the data used and its impact on the risk assessment;		P

EN ISO 12100:2010			
Clause	Requirement-Test	Result-Remark	Verdict
	e) the risk reduction objectives to be achieved by protective measures;		P
	f) the protective measures implemented to eliminate identified hazards or to reduce risk;	Warning sign and wear PPE	P
	g) residual risks associated with the machinery;		P
	h) the result of the risk assessment (see Figure 1);	See the risk assessment report.	P
	i) any forms completed during the risk assessment.		P
	Standards or other specifications used to select protective measures referred to in f) above should be referenced.		P

Part II： EN 60204-1:2018+A1:2025 test report

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
1	**Scope**	
	This part of EN 60204 applies to the application of electrical and electronic equipment and systems to machines not portable by hand while working. Including a group of machines working higher level system aspects	Pass. This machine is within this scope.
	This part is applicable to the electrical equipment or parts of the electrical equipment that operate with nominal supply voltages not exceeding 1000V for alternating current and not exceeding 1500V for direct current, and with nominal frequencies not exceeding 200Hz	Pass
2	**Normative references**	-
3	**Definitions**	-
4	**General requirements**	
4.1	The risks associated with the hazards relevant to the electrical equipment shall be assess as part of the overall requirements for risk assessment of the machine	Pass. See the risk assessment report in detail.
4.2	Selection of equipment	
	Electrical components and devices shall be suitable for their intended use and shall conform to relevant IEC standards where such exist	Pass. Suitable for their intended use
4.3	Electrical supply	
4.3.1	Electrical equipment to be designed for correct operation with conditions of mains power supply	Pass. See below
4.3.2	Supply Voltage:	Pass.
	Frequency:	Pass.
	Harmonics:	Pass. <10% of the total r.m.s voltage
	Voltage unbalance:	Pass. <2% positive sequence
	Voltage interruption:	Pass. Comply with

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
		requirement
	Voltage dips:	Pass. Comply with requirement
4.3.3	DC Supplies Voltage:	Not applicable. AC power supply
	Voltage interruption	Not applicable.
	Ripple (peak-peak):	Not applicable.
4.3.4	Onboard power supply acc. to cl. 4.3.2 and 4.3.3	Not applicable.Not onboard power supply
4.4	Physical environment and operating conditions	Pass. See instruction
4.4.1	Electrical equipment to be suitable for use in physical environment and operating conditions	Pass.
4.4.2	Electromagnetic compatibility (EMC)	Not applicable.
	Equipment not to generate electromagnetic disturbances above harmful levels: (applicable EMC-standard: EN 50081-2)	Not applicable.
	Equipment has adequate level of immunity to EMC: (applicable EMC-standards: EN 50082-2)	Not applicable.
4.4.3	Electrical equipment to be capable for correct operation at intended ambient air temperature	Pass.
4.4.4	Electrical equipment to be capable for correct operation at specified relative humidity: at and	Pass. < 75%,for a short time, maximum 95%
4.4.5	Electrical equipment capable of operating correctly at altitudes up to 1000 m above m.s.l.	Pass.
4.4.6	Electrical equipment shall be adequately protected against ingress of solid properties and liquids	Pass.
4.4.7	Ionizing and non-ionizing radiation Electrical equipment subject to radiation, additional measures to be taken to avoid equipment malfunction	Not applicable. The electrical equipment of the machine is not subject to ionizing and non-ionizing radiation.
4.4.8	Undesirable effects of vibration, shock and bump avoided	Not applicable
4.5	Transportation and storage	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	-2.5 ◦ C to + 55 ◦ C And short periods not exceeding 24 h at up to + 70 ◦ C	Pass. Comply with the requirements
4.6	Provisions for handling	Pass.
	Heavy and bulky equipment shall be moved by cranes or similar equipment	Pass. Appropriate equipments are provided.
4.7	Installation and operation	Pass.
	According to supplier's instructions	Pass. All the related information is stated in the instruction manual.
5	**Incoming supply conductors terminations and devices for disconnecting and switching off**	**Pass.**
5.1	Incoming supply conductor terminations	Pass.
	Single or multiple power supply	Pass. Single power supply.
	The supply conductors are terminated at the supply disconnection device if not, the separate terminals shall be provided	Pass.
	If a neutral conductor is used, it shall be indicated clearly in the technical documentation	Not applicable.
	No connection between the protective bonding circuit and the neutral conductor	Not applicable.
	All terminals for the incoming supply connection shall be identified clearly	Pass.
5.2	Terminal for connection to the external protective earthing system	Pass.
	Shall be in the vicinity of the associated phase conductor terminals	Pass.
	Cross-sectional area of the external protective copper conductor according to table 1	Pass.
	Marking of the external protective conductor with the letters "PE"	Pass. 'PE' is marked.
	Other protective terminals shall be marked with the symbol ⏚	Pass. ⏚
	All protective terminals shall be coloured by use of the bicolor combination Green-And-Yellow	Pass. Green-And-Yellow
5.3	Supply disconnecting (isolating) device	Pass
5.3.1	General	

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Shall disconnect (isolate) the electrical equipment of the machine from supply when required	Pass.
	If two or more supply disconnecting devices are provided, protective interlocks shall be used	Not applicable.
5.3.2	Type	-
	4. Switch-disconnector according to en60947-3 5. A disconnector with auxiliary contact 6. Circuit breaker according to EN 60947-2 7. any other switching device in accordance with an IEC product standard 8. a plug/socket combination for a flexible cable supply.	Pass. a) and b) has been used.
5.3.3	Requirements	-
	Have one OFF and one ON position only	Pass.
	Marked clearly with “I” and “O”	Pass.
	Have a reset(tripped) position between “O” and “I”	Not applicable.
	Have an external operating means	Not applicable.
	The handle should be Black or Grey	Not applicable.
	Could be locked in the OFF position	Not applicable.
	Disconnect all live conductors of its power supply circuit	Pass.
	Sufficient breaking capacity	Not applicable.
5.3.4	Operating handle	-
	Shall be easily accessible and located:0.6 m~1.9 m	Pass.
5.3.5	Excepted circuits	-
	Following circuits not disconnect by supply disconnecting device:	-
	Lighting circuits during maintenance or repair	Not applicable.
	Plug/socket outlets exclusively used for maintenance or repair	Not applicable. No plug/socket outlets
	Undervoltage protection circuits used for automatic tripping only at power supply failures	Not applicable.No undervoltage protection circuits
	Circuits of equipment to remain normally energised for satisfactory operation	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Control circuits for interlocking purposes	Not applicable.
	Circuits which are not disconnected by supply disconnecting device:	-
	Permanent warning labels placed in proximity of supply disconnectors	Not applicable.
	Appropriate remark in maintenance manual	Not applicable.
	Warning label in proximity of circuit concerned	Not applicable.
	or wiring separated from other wiring	Not applicable.
	Wiring of safety interlocking circuits installed with different colour of insulation.	Not applicable.
5.4	Devices for switching off for prevention of unexpected start-up	Not applicable.
	Means shall be provided to prevent inadvertent and / or mistaken closure of the disconnecting device	Not applicable.
	Such devices appropriate and convenient for intended use	Not applicable.
	Suitable placed	Not applicable
	Readily identifiable	Not applicable. marking used
	Disconnecting devices acc. to cl. 5.3.2 used:	Not applicable.
	Other disconnecting devices for the following situations only:	-
	- no significant dismantling of the machine	Not applicable.
	- adjustments requiring a relatively short time	Not applicable.
	No work at the electrical equipment of the machine except:	-
	- no hazard arising of electric shock or burn	Not applicable.
	- switched-off status cannot be released due to maintenance work	Not applicable.
	- work of minor nature	Not applicable.
5.5	Devices provided for disconnecting electrical equipment	Not applicable.
	Supply-disconnecting device used	Not applicable.
	Disconnecting device provided for each separated part of the machine or partial machine where necessary	Not applicable.
	Disconnectors, fuse links etc. used only in enclosed electrical operating areas	Not applicable.
	Such disconnecting devices appropriate and convenient for	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	intended use and	
	Suitably located and	Not applicable.
	readily identifiable to which part it serves and	Not applicable.
5.6	Provided with adequate means to prevent unauthorised, inadvertent and /or mistaken closing	Not applicable.
	Devices acc. to cl. 5.4 and 5.5 provided with locking means	Not applicable.
	Other means of protection against unintended energising used for non-lockable disconnecting devices (for electrical operating areas only)	Not applicable.
	Locking device not necessary for plug/ socket outlet combinations, if located in a suitable manner and under immediate supervision of the person carrying out the work	Not applicable. No plug/ socket outlet combinations.
6	**Protection against electric shock**	**Pass.**
6.1	General	Pass. See the relevant clauses.
6.2	Protection against direct contact	Pass.
6.2.1	General	Pass.
	Either 6.2.2 or 6.2.3 and, where applicable, 6.2.4 shall be applied	Pass. See the relevant clauses.
	When the equipment is located in places open to all persons, measures of either 6.2.3 or 6.2.2 with a min. degree of protection against direct contact corresponding to IP4X or IPXXD shall be applied	Not applicable. This machine shall be located in the factory, and be operated by the authorized persons.
6.2.2	Protection by enclosures	Pass.
	Min protection degree for live parts: IP2X or IPXXB	Pass.
	Min. protection degree for top surface:IP4X or IPXXD	Pass.
	Opening an enclosure shall only be possible under one of the following conditions:	-
a)	The use of a key or tool is necessary by skilled or instructed persons	Pass. Open the enclosure by using a tool
	Min. protection degree for live parts on the inside of doors:IP1X or	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	IPXXA	
	live parts likely to be touched during resetting or adjustment with protection degree IP2X or IPXXB	Pass.
b)	The disconnection of live parts inside the enclosure before the enclosure may be opened (Use of the supply disconnecting device)	Not applicable.
	at door interlocking safety circuit, door will open only when main isolator is in open position	Not applicable.
	For skilled persons a special device provided, to defeat interlocking circuit under following conditions:	Not applicable.
	Special device or tool provided to permit skilled persons to defeat the interlock provided that:	Not applicable.
	- opening of disconnector possible at all times while interlock is defeated	Not applicable.
	- upon closing the door, interlock is automatically restored	Not applicable.
	If more than one door allows access to live parts, care must be taken, at implementation of this subclause	Not applicable.
	All parts remaining live after switching off mains supply to be protected against direct contact with at least IP2X or IPXXB	Not applicable.
	Such parts marked with warning symbol acc. to cl.17.2	Not applicable.
	Excepted from this requirement for marking are:	Not applicable.
	- Parts that can be live only due to connection to interlocking circuits, distinguished by colour as potentially live acc. to cl. 14.2.4	Not applicable.Scope
	- Terminals of supply disconnecting device when latter mounted alone in a separate enclosure	Not applicable.
c)	Opening without the use of a key or a tool and without disconnection of live parts shall be possible only when the min. protection degree is IP2X or IPXXB	Not applicable.
6.2.3	Protection by insulation of live parts	Pass.
	Live parts shall be covered by insulation which can only be removed by destruction	Pass.
	Such insulation shall withstand the mechanical, chemical, electrical	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	and thermal stresses under normal service conditions	
6.2.4	Protection against residual voltages	Pass.
	After disconnecting, any exposed conductive part having a residual voltage that shall be discharged to 60V or less within 5 seconds	Pass. 0V within 1s, comply with requirement
	where pins of plugs or similar devices after withdrawal are exposed, discharge time = 1s	Not applicable.
	such conductors protected against direct contact by at least IP2X or IPXXB	Not applicable.
	if above requirements cannot be achieved, additional disconnecting devices or appropriate warning devices shall be applied. (see cl. 13.8.4)	Not applicable.
6.2.5	Protection by barriers	-
	For protection by barriers, see 412.2 of IEC 60364-4-41	Not applicable.
6.2.6	Protection by placing out of reach or protection by obstacles	-
	For protection by placing out of reach see 412.4 of IEC 60364-4-41	Not applicable.
	For protection by obstacles see 412.3 of IEC 60364-4-41	Not applicable.
	For collector wire systems or collector bar systems with a degree of protection less than IP2X see 13.8.1	Not applicable.
6.3	Protection against indirect contact	Pass.
6.3.1	General	-
	For each circuit or part, at least one of the measures in accordance with 6.3.2 to 6.3.3 shall be applied	Pass. See the following descriptions.
6.3.2	Measure to prevent the occurrence of a hazardous touch voltage	Pass.
6.3.2.1	General	-
6.3.2.2	use of class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation acc. to EN 60536)	Pass. double insulation
	use of switchgear and control gear assemblies with total insulation acc. to EN 60439-1	Pass.
	application of supplementary or reinforced insulation acc. to EN 60364-4-41, 413.2	Pass.
6.3.2.3	Electrical separation of an individual circuit to prevent hazardous touch voltage acc. to	Pass. Electrical clearance and creepage distance

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	EN 60364-4-41, cl. 413.5	comply relevant requirements
6.3.3	Protection by automatic disconnection of supply	Not applicable
	a) Use of protective device for automatic cut-off in the event of an insulation failure in a TN – or TT- system	Not applicable
	b) Use of earth fault detection device to initiate automatic disconnection in an IT-System.	Not applicable
	initiation of warning signal only in case of first occurrence of a fault permitted	Not applicable
6.4	Protection by the use of PELV	Not applicable
6.4.1	General requirements	-
	a) nominal voltage not to exceed 25 AC (r.m.s.) or 60 DC (ripple-free) or	Not applicable. No PELV circuit
	6VAC or 15VDC for all other cases	Not applicable
	b) one side of PELV- circuit or one point of source of supply to be connected to PE- circuit	Not applicable
	c) live parts of PELV- circuits to be electrically separated from other live circuits.	Not applicable
	Electrical separation equal as required for safety isolating transformers (see IEC 60742)	Not applicable
	d) conductors of each PELV circuit to be physically separated from those of any other circuit.	Not applicable
	If not practicable, insulation provisions acc. to cl. 14.1.3 shall be applied	-
	e) plugs and socket outlets for PELV- circuits shall conform to following requirements:	-
	plugs shall not be able to enter socket outlets of other voltage systems	Not applicable
	socket outlets shall not admit plugs of other voltage systems	Not applicable
6.4.2	Sources for PELV	Not applicable
	safety isolating transformers	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	source of current providing a degree of safety, equivalent to safety isolating transformers	Not applicable
	electrochemical or other source, independent of circuit with higher voltage	Not applicable
	electronic power supply conforming to appropriate standards	Not applicable
7	**Protection of equipment**	**Pass.**
7.1	General	-
7.2	Over current protection	Not applicable
7.2.1	Overcurrent protection device provided	Not applicable
7.2.2	Supply conductors	Pass.
	The supplier is not responsible for providing the over current device for the supply conductors	Pass.
	Installation diagram with data necessary for selection of the over current protective device	Pass.
7.2.3	Power circuits	Not applicable
	All conductors shall be protected against over current (except earthed neutral conductor)	Not applicable
	Cross-section area of neutral conductor	Not applicable
	For neutral earth conductors with cross sections smaller than phase conductors, measures acc. to item b, cl 473.3.2.1 of IEC 60364-4-473 will apply	Not applicable
	For IT-systems use of neutral earth conductor (N) is not recommended. Nevertheless if an N-conductor is used, measures acc. to cl. 473.3.2.2 of IEC 60364-4-473 shall apply.	Not applicable
7.2.4	Control circuits	Not applicable
	Conductors of control circuits directly connected to supply voltage and circuits feeding control voltage transformers protected against overcurrent acc. to cl. 7.2.3	Not applicable
	Control circuits fed via transformers of which one end of secondary winding is connected to PE circuit, will require overcurrent protective device only in the other secondary conductor	Not applicable. No winding of secondary connect to PE terminal
7.2.5	Socket outlets and their associated conductors	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Overcurrent protection devices for socket outlets provided for non-earthed live conductors of each circuit feeding such socket outlets	Not applicable. No socket outlets and associated conductors
7.2.6	Lighting circuits	Not applicable
	All unearthed conductors of local lighting circuits protected by overcurrent protective devices	Not applicable
7.2.7	Transformers	Not applicable
	Transformers shall be protected against overcurrent in accordance with the manufacturer's instructions	Not applicable
	Avoid unnecessary tripping due to overcurrent caused by magnetizing inrush currents	Not applicable
	Avoid temperature rise of transformer winding in excess of its permitted of its insulation class of transformer in case of short circuit at secondary terminals	Not applicable
	Type and setting of overcurrent protective device acc. to recommendations of transformer manufacturer	Not applicable
7.2.8	Location of over current protective device	Not applicable
	Overcurrent protective device located at point where conductor is connected to the supply	Not applicable
	Current carrying capacity of conductors at least equal to that required for electrical load	Not applicable
	Each connecting conductor to overcurrent protective devices not longer than 3 meters	Not applicable
	Conductor protected by enclosure or duct	Not applicable. By enclosure
7.2.9	Over current protective devices	Not applicable
	Rated short-circuit breaking capacity at least equal to prospective fault current at point of installation	Not applicable.
	Current other than those coming from supply side taken into account	Not applicable.
	Reduced breaking capacity is permitted, where another protective device is installed at supply side with the necessary breaking	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	capacity	
	Back-up protection carefully checked, no destruction of conductor or overcurrent protective device may result	Not applicable.
	Co-ordination with other protective devices in circuit required	Not applicable.
	Overcurrent protective devices in power circuits include fuses and circuit breakers. Electronic current limiting devices may also be used in protected circuits	Not applicable.
7.2.10	Rating and setting of over current protective devices	Not applicable.
	Rated current of fuses or overcurrent setting of other protective devices selected as low as possible, but adequate for anticipated overcurrents.	Not applicable.
	Settings of overcurrent protective devices appropriately listed in technical documentation	Not applicable.
7.3	Overload protection of motors	Pass.
	Overload protection for all motors provided for ratings of > 0.5 kW in continuous operation.	Pass.
	Protective device may be omitted for motors which cannot be overloaded	Pass. Can’t be overloaded
	Overload protection achieved by current sensing or limiting devices or temperature sensors.	Pass.
	Current overload detection provided for each live conductor except for neutral conductor	Pass.
	For motors supplied by single phase AC or DC power supply, current detection in one non-earthed live conductor only is permitted	Not applicable. 3~ AC power applied
	If overload protection is achieved by switching-off device, all live conductors cut from power supply except neutral conductor	Pass. Comply with requirement
	For special duty motors, appropriate protective devices are recommended	Not applicable.
	For motors where cooling can be impaired, a built- in thermal protection is recommended	Not applicable.
	Automatic restarting of motors prevented after operation of	Pass. Excessive

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	overload protective device, to avoid cause of a hazardous condition	temperature reached, motors stop, and start the motor using a start-button located on operator area
7.4	Abnormal temperature protection	Pass.
	Resistance heating or similar devices which cause excessive heat, equipped with suitable overtemperature detection	Pass.
7.5	Protection against supply interruption or voltage reduction and subsequent restoration	Not applicable.
	Undervoltage protection provided for applications where loss of supply or undervoltage causes a hazardous condition	Not applicable. Undervoltage protection is not provided.
	If interruption or reduction of supply voltage is allowed for a short period of time, delayed undervoltage protection provided.	Not applicable.
	Undervoltage protection not impair any stopping control of the machine	Not applicable.
	Upon restoration of supply voltage, automatic or unexpected restarting of machine prevented	Not applicable.
	Undervoltage protection to initiate appropriate control responses to ensure co-ordination the groups of machines working together	Not applicable.
7.6	Motor over speed protection	Not applicable.
	Overspeed protection provided where overspeeding causes a hazardous condition	Not applicable.
	Overspeed protection initiates appropriate control response and prevents automatic restarting	Not applicable.
7.7	Earth fault/residual current protection	Not applicable.
	To reduce damage to equipment due to earth fault currents below detection level, earth fault/residual protect used	Not applicable.
	Detection level for earth fault protection set as low as possible	Not applicable.
7.8	Phase sequence protection	Not applicable.
	Where an incorrect sequence of the supply voltage can cause a hazardous condition or damage to the machine, protection shall be	Not applicable. Incorrect phase sequence of supply

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	provided	voltage will not cause a hazardous condition
7.9	Protection against over voltage due to lighting and to switching surges	Pass.
	Protective devices for the suppression of overvoltages caused by lightning strikes or switching surges provided	Pass.
	Devices for suppression of overvoltages due to lightning, connected at incoming terminals of the supply disconnecting device	Pass.
	Devices for suppression of overvoltages due to switching surges connected across terminals of all equipment requiring such protection	Pass.
8	**Equipotential bonding**	**Pass.**
8.1	General	-
8.2	Protective bonding circuit	Pass.
8.2.1	General	-
	On mobile machines with on-board power supplies, it shall be connected to a protective bonding terminal to provide protection against electric shock	Not applicable. Not movable machine
	When a mobile machine is also capable of being connected to an external incoming supply, the protective bonding terminal shall be the connection point for the external protective conductor	Not applicable. Not movable machine
	All parts of the protective bonding circuit shall be so designed that they are capable of withstanding the highest thermal and mechanical stresses	Pass. Provided by user according to instructions
	Any structural part of the electrical equipment or of the machine may be used as part of protective bonding circuit	Pass.
	If an IT distribution system is used, the machine structure shall be sued as part of the protective bonding circuit in conjunction with an earth fault supervision system	Not applicable. No IT system applied
8.2.2	Protective conductors	Pass.
	Protective conductors shall be identified according to 14.2.2	Pass. See clause 14.2.2 in detail.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Copper conductors should be used	Pass. Copper used
	Where a conductors material other than copper is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor and such conductors shall not be less than 16 mm2 in cross-sectional area	Not applicable. Only copper conductors are used.
	The cross-sectional area of protective conductors shall be determined according to the requirements of: -543 of IEC 60364-5-54; or -7.4.3.1.7 of IEC 60439-1, as appropriate	Pass.
	Relationship between cross-section area of phase conductor and PE acc. to table 1	Pass.
8.2.3	Continuity of the protective bonding circuit	Pass.
	All exposed conductive parts shall be connected to the protective bonding circuit	Pass. Connect to protective bonding circuits
	In case of removal of parts of PE system, remaining parts not to be interrupted	Pass. If one part removed, protective continuity not interrupted
	Connection and bonding points shall be so designed that their current-carrying capacity is not impaired by mechanical, chemical, or electrochemical influence	Pass. Not impaired by mechanical, chemical or electrochemical influences
	Particular consideration should be given if enclosure consists of aluminium and its alloys	Pass. No aluminium and its alloys used
	Metal ducts of flexible or rigid construction and metallic cable sheathes shall not be used as protective bonding conductors	Pass. No metal ducts and cable armouring used as or connected to protective bonding circuits
	Where the electrical equipment is mounted on lids, doors, or cover plates, continuity of the protective bonding circuit shall be ensured and it is recommended that a protective conductor is used	Not applicable. No such electrical equipment

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Continuity of protective conductor ensured at cables which are exposed to damage	Not applicable.
8.2.4	Exclusion of switching devices from the protective bonding circuit	Pass.
	Protective bonding circuit not incorporate a switching-/overcurrent protective device nor a means for current detection	Pass. No switching devices or any other current protective devices
	Interruption of protective conductors permitted by links, intended to be opened by instructed/skilled persons for test or measurement purposes by using a tool	Pass.
8.2.5	Parts that need not to be connected to the protective bonding circuit	Pass.
	Parts which cannot be touched on large surfaces or grasped by hand due to its small size (less than approx. 50 x 50 mm), small parts such as screws, rivets, nameplates or	Pass.
	are located in such way, that either contact with live parts or an insulation failure is unlikely	Pass.
8.2.6	Protective conductor connecting points	Pass.
	All protective conductors shall be terminated in accordance with 14.1.1	Pass. Please see the related clause.
	Shall have no other function and shall not be used to attach or connect appliances or parts	Pass. Only for earth connection
	Use of earthing symbol ⏚	Pass. Earthing symbol is used.
	By the bicolor combination GREEN-AND-YELLOW	Pass.GREEN-AND-YELLOW
8.3	Functional bonding	Pass.
	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. See the following descriptions.
	For recommendations regarding functional bonding to avoid maloperation due to electromagnetic disturbances, see 4.4.2.	Pass.
8.4	Measures to limit the effects of high leakage current	Not applicable.
	The effects of high leakage current can be restricted to the	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	equipment having high leakage current by connection of that equipment to a dedicated supply transformer having separate windings.	
9	**Control circuits and control functions**	**Pass.**
9.1	Control circuits	-
9.1.1	Control circuit supply	-
	Transformers shall be used for supplying the control circuits	Pass. The transformers has been used.
	If several transformers used, secondary voltages in phase	Not applicable
	DC- control circuits connected to PE circuit supplied from a separate winding of the control circuit transformer or supplied from another control circuit transformer	Pass,
	Transformers not mandatory for machines with a single motor starter and maximum of two control devices	Not applicable
9.1.2	Control circuit voltages	-
	The nominal voltage shall not exceed 277 V when supplied from a transformer	Pass. It doesn't exceed 277 V.
9.1.3	Protection	Pass.
	Over current protection shall be provided according to 7.2.4 and 7.2.10	Pass.
9.2	Control functions	Pass.
9.2.1	Start functions	Pass.
	Start functions shall operate by energizing the relevant circuit	Pass.
9.2.2	Stop functions	Pass.
	Category 0: Stopping by immediate removal of power to machine actuators	Pass.
	Category 1: A controlled stop with power available to machine actuators. Then removal of power when stop condition has been achieved.	Not applicable.
	Category 2: A controlled stop with power left available to machine actuators	Not applicable.
9.2.3	Operating modes	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	When hazardous conditions can arise from mode selection, such selection shall be prevented by suitable means.	Pass.
	Mode selection by itself shall not initiate machine operation (A separate action by the operator shall be required)	Pass.
	Safeguarding shall remain effective for all operating modes	Pass.
	Indication of the selected operating mode shall be provided	Pass.
9.2.4	Suspension of safety functions and/or protective measures	Pass.
	Where it is necessary to suspend safety functions and/or protective measures (for example for setting or maintenance purposes), protection shall be ensured by:	-
	-disabling all other operating (control) modes; and	Pass.
	-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;	Pass.
	-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;	Not applicable.
	-a cableless control station with a device to initiate stop functions in accordance with 9.2.7.3 and, where appropriate, an enabling device.	Not applicable.
	-limitation of the speed or the power of motion;	Not applicable.
	-limitation of the range of motion.	Not applicable.
9.2.5	Operation	Pass.
9.2.5.1	General	Pass.
	The necessary interlocks (see 9.3) shall be provided for safe operation	Pass.
	Measures shall be taken to prevent movement of the machine in an unintended manner after any stopping of the machine	Not applicable.
9.2.5.2	Start	Pass.
	The start of an operation shall be possible only when all the safeguards are in place and functional (except described in 9.2.4)	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Hold-to-run control shall be used for the others machines, as appropriate	Not applicable.
	Suitable interlocks shall be provided to secure correct sequential starting	Not applicable.
	The use of more than one control station to initiate a start	Not applicable.
9.2.5.3	Stop	Pass.
	Category 0, category 1 and/or category 2 stops shall be provided where indicated by the risk assessment and the functional requirements of the machines	Pass.
	Stop functions shall override related start functions	Pass.
	Facilities provided for connection of protective devices / interlocks	Not applicable.
	If such protective device/ interlock causes a machine stop, it may be necessary to send such condition to the logic of the control system (PLC)	Not applicable.
	Resetting of stop function must not initiate any hazardous condition	Pass .
9.2.5.4	Emergency operations (emergency stop, emergency switching off)	Pass.
9.2.5.4.1	General	-
9.2.5.4.2	Emergency stop	Pass.
	Shall function either as a category 0 stop or as a category 1 stop	Pass.
	The choice of the emergency stop shall be determined by the risk assessment of the machine	Pass.
	Where a category 0 stop is used for emergency stop function, it shall have only hard-wired electromechanical components	Pass.
	Emergency stop has priority over all other functions and over all modes of operation	Pass.
	Power to machine actuators that can cause hazardous condition(s) removed as quickly as possible without creating other hazards	Pass.
	Resetting must not initiate a restart	Pass.
9.2.5.4.3	Emergency switching off	-
	Functional aspects of emergency switching-off function are given in IEC 60364-4-46 and should be provided where:	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Protection against direct contact is achieved only by placing out of reach or by obstacles	Not applicable
	There is the possibility of other hazards or damage by electricity	Not applicable.
	Emergency switching-off is accomplished by disconnecting incoming supply of the machine, effecting in a category 0 stop	Not applicable.
	When a machine cannot tolerate a category 0 stop, other means of protection is to be provided so that emergency switching-off is not necessary	Not applicable.
9.2.5.5	Monitoring of command actions	-
	Movement or action of a machine or parts of it, that can result in a hazardous condition be monitored	Pass.
	On manually controlled machines, operators to provide some monitoring	Pass.
	Conditions expected to be unreasonable for monitoring by the operator, require means to monitor such conditions	Pass.
9.2.6	Other control functions	Pass.
9.2.6.1	Hold-to-run controls	Pass.
	Hold-to run controls shall require continuous actuation of the control devices to achieve operation	Pass.
9.2.6.2	Two-hand control	Not applicable.
	Three types of two-hand control are available, the selection of which is determined by the assessment	Not applicable.
9.2.6.3	Enabling device	Not applicable.
	It shall be designed to allow motion when actuated in one position only (In any other position motion shall be stopped)	Not applicable.
9.2.6.4	Combined start and stop controls	Not applicable.
	Push-buttons and similar devices that, when operated, alternately initiate and stop motion shall only be used for functions which cannot result in a hazardous condition	Not applicable. No this kind of device has been used.
9.2.7	Cableless control	Not applicable. Not provided
9.2.7.1	General	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Means shall be provided to readily remove or disconnect the power supply of the operator control station	Not applicable. No cableless control is used.
	Means shall be provided, as necessary, to prevent unauthorized use of the operator control station	Not applicable. No cableless control is used.
	Each operator control station shall carry an unambiguous indication of which machine is intended to be controlled by that operator control station	Not applicable. No cableless control is used.
9.2.7.2	Control limitation	-
	Measures shall be taken to prevent the machine from responding to signals other than those from the intended operator control station	Not applicable. No cableless control is used.
	Where necessary, means shall be provided so that the machine can only be controlled from operator control station in one or more predetermined zones or locations	Not applicable. No cableless control is used.
9.2.7.3	Stop	-
	Operator control stations shall include a separate and clearly identifiable means to initiate the stop function of the machine or of all the motions that can cause a hazardous condition	Not applicable. No cableless control is used.
	The actuating means to initiate this stop function shall not be marked or labeled as an emergency stop device	Not applicable. No cableless control is used.
	A machine which is equipped wit cableless control shall have a means of automatically initiating the stopping of the machine and of preventing a potentially hazardous operation	Not applicable. No cableless control is used.
9.2.7.4	Use of more than one operator control station	
	Where a machine has more than one operator control station, measures shall be taken to ensure that only one control station can be enabled at a given time	No cableless control is used.
	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	Not applicable. No cableless control is used.
9.2.7.5	Battery-powered operator control stations	Not applicable.
	A variation in the battery voltage shall not cause a hazardous	Not applicable. No

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	condition	cableless control is used.
	If one or more potentially hazardous motions are controlled using a battery-powered operator control station, a clear warning shall be given to the operator when a variation in battery voltage exceeds specified limits	Not applicable. No cableless control is used.
	Under those circumstances, the operator control station shall remain functional long enough to put the machine into a non-hazardous condition	Not applicable. No cableless control is used.
9.3	**Protective interlocks**	**Not applicable.**
9.3.1	Reclosing or resetting of an interlocking safeguard	Not applicable.
	The reclosing or resetting of an interlocking safeguard shall not initiate machine motion or operation	Not applicable.
9.3.2	Exceeding operating limits	Not applicable.
	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.	Not applicable.
9.3.3	Operation of auxiliary functions	Not applicable.
	The correct operation of auxiliary functions shall be checked by appropriate devices	Not applicable.
	Use of appropriate interlocking	Not applicable.
9.3.4	Interlocks between different operations and for contrary motions	Not applicable.
	Interlocks of contactors, relays, etc. between different operations and for opposite motions, interlocks against such incorrect operation provided	Not applicable.
	Reversing contactors interlocked in such way, that in normal service no short circuit occurs during switching operation	Not applicable.
	Where, for safety or for continuous operation, certain functions on the machine are required to be interrelated, proper co-ordination ensured by suitable interlocks	Not applicable.
	For a group of machines working together in a co-ordinated manner and having more than one controller, provisions made for	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	co-ordination of this controller	
	If a failure of a mechanical brake actuator can result that the brake, is applied when the associated machine actuator is energised and a hazardous condition results, interlocks be provided to switch off the machine actuator	Not applicable.
9.3.5	Reverse current braking	**Not applicable**
	Reverse current braking on a motor, effective measures taken to avoid motor starting in opposite direction at end of breaking where that reversal causes a hazardous condition, damage to the machine or to the process	Not applicable. No reverse current braking used for AC rotating motor
	Control circuits arranged so, that rotation of a motor shaft, not to result in a hazardous condition	Not applicable
9.4	Control functions in the event of failure	Not applicable
9.4.1	General requirements	Not applicable
	Measures to reduce those risks include but are not limited to:	-
	protective devices on the machine, (e.g. interlocking guards, trip devices)	Not applicable
	protective interlocking of electrical circuit	Not applicable
	use of proven circuit techniques and components (see cl. 9.4.2.)	Not applicable
	provision of partial or complete redundancy (see cl. 9.4.2.2) or diversity (see cl. 9.4.2.3)	Not applicable
	provision for functional tests (see cl. 9.4.2.4)	Not applicable
	single failures only are to be considered	Not applicable
	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.	Not applicable
	Means shall be provided to prevent unauthorized or inadvertent memory alteration by, for example, requiring the use of a key, access code or tool.	Not applicable
9.4.2	Measures to minimize risk in the event of failure	Not applicable
9.4.2.1	Use of proven circuit techniques and components	Not applicable
	bonding of control circuits to protective circuit for operational	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	purposes (see cl. 9.4.3.1)	
	connection of control devices in accordance with cl. 9.1.4	Not applicable
	stopping by de-energising (see cl. 9.2.2)	Not applicable
	switching of all live conductors to device being controlled (see cl. 9.4.3.1)	Not applicable
	use of switching devices having positive (or direct) opening operation (see IEC 60947-5-1)	Not applicable
	circuit design to reduce possibility of failures causing undesirable operations	Not applicable
9.4.2.2	Provisions of partial or complete redundancy	Not applicable
	off-line redundancy for protective functions, effective only when operating function fails	Not applicable
	where off-line redundancy is use, suitable measures taken, to ensure that those control circuits are available when required	Not applicable
	on-line redundancy for normal operation	Not applicable
9.4.2.3	Provision of diversity	Not applicable
	Use of control circuits having different principles of operation or using different types of devices may reduce faults and failures. Examples include:	-
	Combination of normally open and normally closed contacts operated by interlocking guards	Not applicable. Not provided
	Use of different types of circuit components in control circuit	Not applicable.
	Combination of electromechanical and electronic circuits in redundant configurations	Not applicable.
	Combination of electrical and non-electrical systems (e.g. mechanical, hydraulic, pneumatic) may perform redundant functions and provide diversity	Not applicable.
9.4.2.4	Provision for functional tests	Pass.
	Automatic functional test carried out by the control system	Pass. Comply with clause 18.6
	Manual function tests by inspection	Pass. Comply with clause 18.6

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Tests at start-up and at predetermined intervals or as a	Pass. Comply with clause 18.6
	Combination as appropriate (see cl.17.2 and 18.6)	Pass. Comply with clause 18.6
9.4.3	Protection against maloperation due to earth faults, voltage interruptions and loss of circuit continuity	Pass.
9.4.3.1	Earth faults	Pass.
	Earth faults on any control circuit causes no unintentional starting, potentially hazardous motions or prevent stopping of machine	Pass. No motion
	For fulfilment of this requirement, bonding to PE-circuit provided and correct connection of devices ensured	Pass. PE circuit connected to conductor
	Control circuits fed from transformer and not connected to PE-circuit provided with an insulation monitoring device	Not applicable. Control circuits connected to PE circuits
	Multi-pole control switches which interrupt all live conductors use for START or STOP functions, which could cause hazardous condition or damage to the machine, in the event of unintentional starting or failure to stop.	Not applicable. No multi-pole control switches
9.4.3.2	Voltage interruptions	Pass.
	Where a memory device is used, proper functioning in the event of power failure shall be ensured to prevent any loss of memory that can result in a hazardous condition	Pass. Any loss of memory can’t result in a hazardous condition.
9.4.3.3	Loss of circuit continuity	Pass
	Where the loss of continuity of safety-related control circuits depending upon sliding contacts can result in hazardous condition, appropriate measures shall be taken	Not applicable. No sliding contact used
10	**Operator interface and machine-mounted control devices**	-
10.1	General	Pass.
10.1.1	General device requirements	Pass.
	As far as is practicable, those devices shall be selected, mounted, and identified or coded according to IEC 60073and IEC 60447	Pass.
10.1.2	Location and mounting	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Machine-mounted control devices readily accessible for service and maintenance and	Pass.
	Mounted to minimize possibility of damage from activities such as material handling	Pass.
	Actuators of hand-operated control devices selected and installed as follows:	-
	Mounted not less than 0.6 m above servicing level, and within easy reach for operator (normal working position)	Pass.
	Placed so that operator is not exposed to a hazardous situation when operating them	Pass.
	Possibility of inadvertent operation is minimised	Pass.
10.1.3	Protection	Pass.
	Degree of protection sufficient for expected use against:	-
	Effects of aggressive liquids, vapours or gases in environment of machine	Pass
	Ingress of contaminants	Pass.
	Operator interface control devices have a minimum degree of protection against direct contact of IPXXD	Pass. IP2X
10.1.4	Position sensors	Not applicable.
	Position sensors shall not be damaged in the event of over travel	Not applicable.
	Position sensors used in circuits with safety-related functions shall have positive opening operation or shall provide similar reliability	Not applicable.
10.1.5	Portable and pendant control stations	Not applicable.
	Portable and pendant control stations and their control devices shall be so selected and arranged as to minimize the possibility of inadvertent machine operations caused by shocks and vibrations	Not applicable.
10.2	Push-buttons	Pass.
10.2.1	Colors	Pass.
	Push-button actuators shall be color -coded according to table 2	Pass. The color are according to table 2
10.2.2	Markings	Pass.
	Recommendation that pushbuttons are preferably marked directly	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	on actuator with symbols acc. to table 3	
10.3	Indicator lights and displays	Pass.
10.3.1	Colours for indication lights: RED, YELLOW, GREEN, BLUE Colours for confirmation: GREEN and WHITE	Pass.
10.3.2	Colors	Pass.
	Color-coded according to table 4 (Unless otherwise agree between the supplier and the user)	Pass.
10.3.3	Flashing lights and displays	Not applicable.
	Flashing lights for further information may be used for following purposes:	-
	to attract attention or	Not applicable.
	to request immediate action or	Not applicable.
	to indicate a discrepancy between command and actual state or	Not applicable.
	to indicate a change in process (flashing during transition)	Not applicable.
	higher frequency of flashing lights (pulse/pause ratios) recommended for higher priority of information	Not applicable.
10.4	Illuminated push-buttons	Not applicable.
	Illuminated push-button actuators colour-coded acc. to tables 2 and 4	Not applicable.
	WHITE colour shall be use, if it is difficult in assigning an appropriate colour	Not applicable.
	RED colour shall be use, for emergency stop actuators, not depending upon illumination conditions (ON /OFF status) only	Not applicable.
10.5	Rotary control devices	Not applicable.
	Devices having a rotational member shall be mounted to prevent rotation of the stationary member (Friction alone shall not be sufficient)	Not applicable.
10.6	Start devices	Not applicable.
	Start devices use to initiate start functions or movement of machine or elements designed and mounted such as to minimize inadvertent operation	Not applicable.
	Mushroom - type actuators use for two-hand control devices	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
10.7	Devices for emergency stop	Pass.
10.7.1	Location	Pass.
	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	Pass. Each operator control station contain energency stop.
10.7.2	Types	Pass
	Use of type 3. a push-button operated switch 4. a pull-cord operated switch 5. a pedal-operated switch without a mechanical guard	Pass. A push-botton operated switch.
	Shall be of the self-latching type and shall have positive opening operation	Pass.
10.7.3	Colour of actuators	-
	Actuators of emergency stop devices are coloured RED	Pass.
	Background immediately around actuator is coloured YELLOW	Pass.
10.7.4	Local operation of the supply disconnecting device to effect emergency switching off	Pass.
	Supply disconnecting device may be locally operated to serve as function of emergency stop when:	Pass.
	it is readily accessible to operator	Pass.
	it is of type described in cl. 5.3.2 a), b) or c)	Pass.
	Supply disconnecting device shall meet colour requirements of cl. 10.7.4	Pass.
10.8	Emergency switching off devices	Pass.
10.8.1	Location of emergency switching-off devices normally placed separate from operator control station	Pass.
	Operator control station equipped with separate emergency stop device, since function effects a category 0 emergency stop	Pass.
10.8.2	Types of emergency switching-off devices include: Push-button operated switch or	Pass.
	Pull-cord operated switch	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Devices of self-latching type and ensure positive (or direct) opening operation	Pass.
	Push-button operated switch in break-glass enclosure	Pass.
10.8.3	Actuators of emergency switching-off devices are coloured RED	
	Background immediately around actuator (push-button) coloured YELLOW	Pass.
	Actuators of push-button operated emergency switching-off devices be of palm- or mushroom-head type	Pass.
10.8.4	When supply disconnecting device is locally operated for emergency switching-off, it shall be readily accessible	-
	Supply disconnecting device locally operated for emergency switching-off, shall meet colour requirement acc. to cl. 10.8.3.	Pass.
10.9	Enabling control device	Not applicbale
	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.	Not applicable
11	**Control gear: location, mounting, and enclosures**	**Pass.**
11.1	General requirements	Pass.
	All control gear located and mounted so, as to cover the following points: facilitate accessibility and maintain ability	-
	facilitate protection against external influences or operating conditions under which operation is intended	Pass.
	facilitate easy access for operation and maintenance of the machine and its associated equipment	Pass
11.2	Location and mounting	
11.2.1	Accessibility and maintenance	
	all control-gear components placed and oriented so, that identification is possible without moving them or the associated wiring	Pass.All of them can be identified without moving or the wiring.
	Components checked for correct operation or possible replacement without dismantling other equipment or parts of the machine	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Terminals not associated with control gear also to conform to this requirement	Pass. Those relative requirements have been complied with.
	Operation and maintenance of all control gear possible from front of cabinet	Pass.
	Special tools for removal of electronic devices provided with the equipment	Not applicable
	Access for regular maintenance or adjustment to equipment, relevant devices located between 0.4m to 2.0 m above servicing level	Pass.
	Terminals located at least 0.2 m above servicing level and placed such, that conductors and cables can be easily connected	Pass.
	No devices mounted on doors, except those for operating, indicating, measuring and cooling purposes on normally removable access-covers of enclosure	Not applicable
	Plug-in type control devices belonging functionally together, their association made clear by type (shape), marking or reference designation single or in combination (see cl. 14.4.5)	Not applicable. No plug-in type control devices
	Plug-in type control devices, that are handled during normal operation, shall be designed with non-interchangeable characteristics, where lack of such facility can result in malfunctioning	Not aplicable. No plug-in type control devices
	Use of plug/socket combinations shall be unobstructed access	Not applicable. No plug/socket combinations.
	Plug/socket combinations, handled during normal operation, shall be located and mounted so as to provide unobstructed access	No plug/socket combination
	If test points are provided, they should be:	
	mounted so as to provide unobstructed access	Not applicable
	clearly marked to correspond with the documentation (see cl. 18.3)	Not applicable
	adequately insulated	Not applicable
11.2.2	Physical separation or grouping	

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Non-electrical parts and devices, not directly associated with the electrical equipment, not located within enclosures containing control gear	Pass. No this kind of parts or devices are located within enclosures containing control gear.
	Devices such as solenoid valves separated from other electrical equipment	Pass. All solenoid valves have be separated from the other electrical equipment.
	Control devices mounted at same location and connected to the main supply voltage, or to both main supply and control voltage, are grouped separately from those connected to control voltage only	Pass. Appropriate separation has been taken.
	Terminals separated into groups for: power circuits or	Pass. They have been separated appropriately.
	associated control circuits or	-
	other control circuits, fed from external sources	-
	Terminal groups mounted adjacently, providing that each group is readily identified	-
	When arranging the location of devices, clearances and creepage distances specified for them shall be maintained, taking into account external influences or physical conditions of its environment	-
11.2.3	Heating effects	-
	Heat generating components shall be located so that the temperature of each component in the cicinity remains within the permitted limit	Pass.
11.3	Degrees of protection	
	Protection of control gear against ingress of solid foreign objects and liquids shall be adequate. External influences under which the equipment is intended to operate is to be taken into account and is to be	Pass. IP 23
	Its protection sufficient against dust, coolants and swarf	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Enclosures of control gear provide a degree of protection of at least IP22	Pass. IP23
	Exceptions:	-
	a) Where an electrical operating area is use as a protective enclosure for an appropriate degree of protection against ingress of solid bodies and liquids	
	b) Where removable collectors on collector bar systems are use, and IP22 is not achieved but measures of cl. 6.2.5 are applied	Pass.
11.4	Enclosures, doors and openings	-
	Enclosures to withstand mechanical, electrical and thermal stress as well as effects of humidity during normal service	Pass. The material（metal plate with painting） used for enclosure can withstand the mechanical, electrical and thermal stresses.
	Fasteners for doors or covers of captive type	Pass. Captive type.
	Windows for viewing internally mounted indicating devices, made of material suitable to withstand mechanical stress and chemical attack	Not applicable. No this kind of window.
	Doors of enclosure not wider than 0,9 meter	Pass.
	Doors with vertical hinges	Pass.
	Doors with opening angle of at least 95 °	Pass. These requirements have been taken.
	Gaskets of doors, lids, covers and enclosures withstand the chemical effects of aggressive liquids, vapours or gases use on the machine	Pass.
	Means use to maintain degree of protection of an enclosure of doors, lids and covers that require opening or removed for operational or maintenance shall:	Pass.
	be securely attached to either door, cover or enclosure	Pass.
	not deteriorate due to removal or replacement of door or cover and so impair degree of protection	Pass

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	all openings in enclosure closed by supplier(s), ensuring degree of protection specified for equipment	
	openings for cable entries at enclosure to be easily re-opened on site	Pass,
	suitable opening in base of enclosure within the machine provided, as to enable drainage of moisture due to condensation	Pass.
	no opening between enclosure containing electrical equipment and compartment containing coolant, lubricating or hydraulic fluids	Pass.
	holes in enclosure for mounting purposes not impair required degree of protection	Pass.
	If equipment could attain a surface temperature sufficient to cause a risk of fire during normal or abnormal operation:	Pass.
	located within an enclosure, that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment or	Pass
	mounted and located at sufficient distance from adjacent equipment, so as to allow safe dissipation of heat or	Not applicable
	otherwise screened by material that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment	Not applicable
11.5	Access to control gear	-
	Minimum dimensions of doors and corridors for access to electrical operating areas: at least 0.7 meter wide and 2.0 meter high	Pass.
	Doors open outwards	Pass.
	Doors equipped with means to allow opening from inside without the use of a key or tool	Pass.
12	**Conductors and cables**	-
12.1	General requirements	-
	Conductors and cables selected so as to be suitable for operating conditions and external influences that are existing	Input cables and outer ground bonding conductors are supplied by user according to instructions

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Requirements not applicable for integral wiring of assemblies, subassemblies and devices that are manufactured and tested acc. to their relevant standard	Conform to relevant IEC standards
12.2	Conductors	-
	Conductors shall be of copper	Copper.
	Conductors of any other material shall have a nominal cross-sectional area such that, carrying the same current, the max. temerparure shall not exceed the value given in table 5	Only copper conductors are used.
	If aluminium is used, the cross-sectional area shall be at least 16mm^2	Only copper conductors are used.
	All conductors that are subject to frequent movement shall have flexible stranding of class 5 or class 6 (see table C.4)	Comply with requirement
12.3	Insulation	
	Types of insulation include: Polyvinyl chloride (PVC)	PVC
	Rubber, natural and synthetic	Not applicable.
	Silicone rubber (SiR)	Not applicable.
	Mineral	Not applicable.
	Cross-linked Polyethylene (XLPE)	Not applicable.
	Ethylene Propylene Rubber compound (EPR)	Not applicable.
	Poly-Tetra-Fluor-Ethylene (PTFE)	Not applicable.
	Where insulation of conductors or cables can constitute hazards due to propagation of fire or emission of toxic/ corrosive fumes, guidance from cable supplier to be sought	Not applicable.
	Special attention to integrity of a circuit having a safety-related function	Not applicable.
	Dielectric strength of insulation adequate for required test voltage with a min. of 2000VAC for cables operating with voltages >50V AC or >120 VDC	2000V, no breakdown
	For separate PELV circuits, dielectric strength adequate for test voltage of 500VAC for a duration of 5 minutes	Not applicable.
	Mechanical strength and thickness of insulation such that,	Not be damaged during

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	insulation cannot be damaged during cable laying or in operation	cable laying or in operation
12.4	Current-carrying capacity in normal service	Pass.
	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.	Pass.
	Current-carrying capacities for PVC insulated wiring between enclosures and individual items of equipment under steady-state conditions according to values given in table 6	Pass.
12.5	Conductor and cable voltage drop	Pass.
	The voltage drop for conductors and cables shall not exceed 5% of the nominal voltage	Pass. Not exceed 5%.
12.6	Flexible cables	Pass
12.6.1	General	Pass.
	Flexible cables shall have class 5 or class 6 conductors	Pass
	cables exposed to severe duties shall be of adequate construction to protect against:	-
	abrasion due to mechanical handling and dragging across rough surfaces	-
	kinking to operation without cable guides	-
	stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums	Pass.
12.6.2	Mechanical rating	-
	Cable handling system of machine designed such, as to keep tensile stress of conductors as low as practicable during machine operation	Pass.
	tensile stress for copper conductors not to exceed 15 N/mm^2 of copper cross section area	Pass. <15 N/mm^2 of copper cross section area
	where tensile stress of conductors is exceeding 15 N/mm^2 , cables of special design are use	Not applicable
	maximum stress for flexible cables agreed with the cable manufacturer	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
12.6.3	Current-carry capacity of cables wound on drums	-
	Cables wound on drums selected such, as the maximum allowable conductor temperature is not exceeded	Not applicable. Not be wound on drums
	cables for circular cross-section area, installed on drums, max. current-currying capacity in free air as declared acc. to table 7	Not applicable
12.7	Collector wires, collector bars and slip-ring assemblies	Not applicable
12.7.1	Protection against direct contact	
	They shall be installed or enclosed in such way, that during normal access to the machine, protection against direct contact is achieved by application by one of the following protective measures:	-
	protection by partial insulation of live parts	Not applicable
	protection by enclosure or barriers provide a degree of protection of at least IP2X	Not applicable
	horizontal top surfaces of barriers or enclosures which are readily accessible provide a degree of protection of at least IP4X	Not applicable
	if required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching-off acc. to cl. 9.2.5.4.3 applied	Not applicable
	collector wires and bares placed such and / or protected as to prevent contact, especially for unprotected wires and bars, with conductive items such as, cords of pull-cord switches, strain-relief devices and drive chains and	Not applicable
	prevent damage from a swinging load	Not applicable
12.7.2	Protective conductor circuit	-
	Where collector wires, collector bars and slip-ring assemblies are installed as part of the protective bonding circuit(PE), they shall not carry current in normal operation	Not applicable
	The continuity of the protective conductor circuit using sliding contacts shall e ensured by taking appropriate measures	Not applicable
12.7.3	Protective conductor current collectors	-
	Protective conductors of current collectors have a shape or are designed such, so that they are not interchangeable with other	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	current collectors of the sliding contact type	
12.7.4	Removable current collectors with a disconnect 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	Not applicable
12.7.5	Clearance in air	-
	Clearances between respective conductors and between adjacent systems of collector wires, bars, slip-ring assemblies and their current collectors designed for operation in pollution degree III conditions	Not applicable
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.	Not applicable
	In abnormally dusty, moist or corrosive environments, following creepage distances apply:	Not applicable
	for unprotected collector wires, bars and slip-ring assemblies equipped with insulators, the minimum creepage distance is 60 mm	Not applicable
	for enclosed collector wires, insulated multipole collector bars and insulated individual collector bars, the minimum creepage distance is 30 mm	Not applicable
	gradual reduction of insulation values due to unfavourable ambient conditions regarded	Not applicable
12.7.7	Conductor system sectioning	-
	Suitable design measures taken, in order to prevent energisation of adjacent sections by current collectors themselves	Not applicable
12.7.8	Construction and installation of collector wire, collector bar systems and slip-ring assemblies	-
	Collector wires, collector bar systems and slip-ring assemblies use	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	for power circuits kept separately from those use for control circuit applications	
	above systems capable of withstanding without damage to mechanical forces and thermal effects of short circuit currents	Not applicable
	removable covers to above systems, laid underground or under floor, designed that they cannot be opened by one person without the use of a tool	Not applicable
	collector bars which are installed in a common metal enclosure, the individual section of it bonded together and earthed at several points depending upon their length	Not applicable
	Metal covers of collector bars laid underground or under floor, bonded together end earthed	Not applicable
	Underground and under floor collector bar ducts have drainage facilities	Not applicable
13	**Wiring practices**	**Pass**
13.1	Connections and routing	Pass.
13.1.1	General requirements	Pass.
	All connections shall be secured against accidental loosening	Pass. Fixed by screws
	The means of connection shall be suitable for the cross-sectional areas and neutral of the conductors being terminated	Pass. Fixed by screws
	The connection of two or more conductors to one terminal is permitted (only when the terminal is designed for that purpose)	Pass. No terminal has been connected with three or more conductors.
	One protective bonding circuit conductor shall be connected to one terminal connecting point	Pass. One conductor connected to one terminal.
	Soldered connections shall only be permitted if terminals are suitable for soldering	Not applicable. No soldered connection hass been taked.
	Terminals on terminal blocks shall be plainly identified to correspond with markings on the diagrams	Pass. All of them have been marked corresponding to

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
		markings on the diagrams.
	The installation of flexible conduits and cables shall be such that liquids shall drain away from the fittings	Not applicable. No liquids
	Means to retain stranded conductors together when terminating conductors at terminals/ devices provided	Pass.
	Solder not use for that purpose	Not applicable. No solder used
	Shielded conductors terminated so, as to prevent fraying of strands and to permit easy disconnection	Not applicable.
	Identification tags shall be legible, permanent, and appropriate for the physical environment	Pass. The tags are legible, permanent, and appropriate for the physical environment.
	Terminal blocks shall be so mounted and wired, that the internal and external wiring does not cross over the terminals	Pass. No conductor cross over the terminals.
13.1.2	Conductor and cable runs	Not applicable.
	Shall be run from terminal to terminal without splices or joints	Not applicable.
	If it is necessary to connect and disconnect cables assemblies, a sufficient extra length shall be provided	Not applicable.
	The terminations of cables shall be adequately supported to prevent mechanical stresses at the terminations of the conductors	Not applicable.
	The protective conductor shall be placed close to the associated live conductors in order to decrease the impedance of the loop.	Not applicable.
13.1.3	Conductors of different circuits	Not applicable.
	Conductors of different circuits laid side by side and occupy the same duct or be in same multiconductor cable, provided that such arrangement does not impair proper functioning of respective circuits	Not applicable.
	Where circuits operate at different voltage levels, conductors separated by suitable barriers or insulated for maximum voltage to which any conductor within the same duct is subjected	Not applicable.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
13.1.4	Connection between pick-up and pick-up converter of an inductive power supply system	-
	The cable between the pick-up and the pick-up converter as specified by the manufacturer of the inductive power supply shall be:	-
	as short as practicable;	Not applicable
	adequately protected against mechanical damage.	Not applicable
13.2	Identification of conductors	Pass.
13.2.1	General requirements	Pass.
	Conductors shall be identifiable at each termination according to the technical documentation (see clause 17)	Pass. Identification at each termination
	Conductors are identified by number, alphanumeric, colour (either solid or with one or more stripes), or a combination of colour and numbers or alphanumeric.	Pass. A combination of colour and numbers or alphanumeric.
	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	Pass.
	Shall be really distinguishable by shape, location, marking or color	Pass. By marking and color.
	When identification is by color alone, the bicolor combination GREEN-AND YELLOW shall be used	Pass. By GREEN-AND-YELLOW .
	For the bicolor combination GREEN-AND YELLOW : one of the color covers at least 30% and not more than 70% of the surface of the conductor, the other color covering the remainder of the surface	Pass.
	Use of graphical symbol ⏚	Pass. The earthing symbol has been used.
13.2.3	Identification of the neutral conductor	Pass.
	The color shall be Light Blue	Pass. Light blue
	LIGHT BLUE must not be use for identification of any other conductor where confusion is possible	pass.
	Where bare conductors are use as neutral conductors and	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	identification by colour is use, they either be coloured by LIGHT BLUE stripes, 15 to 100 mm wide in each compartment or unit, or at each accessible position	
	Bare conductor colour coloured LIGHT BLUE over its full length	Pass.
13.2.4	Identification by colour	-
	Identification of other conductors by colour, number, alphanumeric or a combination of colour and numbers or alphanumeric	Pass.
	When numbers are use, they are in Arabic writing ; letters are in Roman characters	Pass.
13.3	Wiring inside enclosures	
	Panel wiring supported where necessary to keep it in place	Pass. Fixed by screws
	Non-metallic ducts permitted only when they are of flame-retardant insulating material	Not applicable
	Electrical equipment mounted inside cabinets, designed to permit modification of wiring from front of cabinet (see cl. 11.2.1)	Pass
	Where that is not possible, access, doors or swing out panels provided	Not applicable
	Connections to devices mounted on doors or to other movable parts made with flexible conductors (acc. to cl.13.2) to allow for frequent movement of those parts	Not applicable
	Conductors be anchored to the fixed part and the movable part, independently of the electrical connection	Pass. Fixed by screws and rubber cushion anchor
	Conductors and cables that do not run in ducts are adequately supported	Pass.
	Terminal blocks or plug /socket combinations use for control wiring, that extends beyond the enclosure	Pass. Terminal blocks used for control wiring that extend beyond the enclosure
	Power cables and cables for measuring-circuits are directly connected to terminals of field located devices	Pass.
13.4	Wiring outside enclosures	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
13.4.1	General requirements	Pass.
	The protection degree shall be ensured when cables or ducts are introduced into the enclosure	Pass.
13.4.2	External ducts	Pass.
	Shall be enclosed in suitable ducts as described in 13.5 except for suitably protected cables	Pass.
	Exempt from above requirements are suitably protected cables, installed without ducts and with or without use of open cable trays or cable supporting means	Not appliacble
	Fittings used with ducts or multiconductor cable shall be suitable for the physical environment	Not applicable
	Flexible conduction or flexible multiconductor cable shall be used where it is necessary to employ flexible connections to pendant push-button stations	Pass.
	The weight of the pendant stations shall be supported by means other that the flexible conduit or the flexible multiconductor cable	Not applicable
	Flexible conduit or flexible multiconductor cable shall be used for connections involving small or infrequent movements	Not applicable
13.4.3	Connection to moving elements of the machine	
	Connection to frequently moving parts shall be made using conductors according to 12.2 and 12.6	Not applicable Not used
	Flexible cable and flexible conduit shall be so installed as to avoid excess flexing and strainging, particularity t the fittings	Not applicable
	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	Not applicable
	If the requirement mentioned above is achieved by using 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	Not applicable
	Flexible cables of machines installed or protected in such way, as to minimise the possibility of external damage due to factors, that include the following cable use or potential abuse:	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	being runned over by the machine itself	Not applicable
	being runned over by vehicles or other machines	Not applicable
	coming into contact with the machine structure during movements	Not applicable
	running in and out of cable baskets or, on / off cable drums	Not applicable
	acceleration and wind forces on festoon systems or suspended cables	Not applicable
	excessive rubbing by cable collector	Not applicable
	exposure to excessive radiated heat	Not applicable
	Cable sheath resistant to normal wear expected from normal movement and effects of atmospheric contaminants	Not applicable
	If cables subject to movement are close to moving parts, it shall have a space of at least 25 mm between the moving parts and the cables	Not applicable
	Where the distance mentioned above is not practicable, fixed barriers shall be provided between the cables and the moving parts	Not applicable
	The cable handing system shall be so designed that the lateral cable angles do no exceed 5°, avoiding torsion in the cable	Not applicable
	Measures shall be taken to ensure that at least two turns of flexible cables always remain on a drum	Not applicable
	Min. permitted bending radii for the forced guiding of flexible cables shall not less than the values given in table 8	Not applicable
	The strength section between section between two bends in an S-shaped length or a bend into another plane shall be at least 20 times the diameter of the cable	Not applicable
	Where flexible conduit is adjacent to moving parts, the construction and supporting means shall prevent damage to the flexile conduit under all conditions of operation	Not applicable
13.4.4	Interconnection of devices on the machine	Not applicable
	The connections shall be conveniently placed, adequately protected, and shown on the relevant diagrams	Not applicable
	Intermediate terminals are adequately protected	Not applicable
	Intermediate terminals are indicated on the wiring diagram	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	This enables easy access for testing purposes	Not applicable
13.4.5	Plug/socket combinations	Pass.
	Where plug/socket combinations are provided, they shall fulfil one or more of the following requirements as applicable:	-
	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.	Pass.
	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.	Pass.
	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	Not applicable
	d) Plug/socket combinations that are rated at more than 16 A shall have a retaining means to prevent unintended or accidental disconnection.	Pass.
	e) Where an unintended or accidental disconnection of plug/socket combinations can cause a hazardous situation, they shall have a retaining means.	Not applicable
	The installation of plug/socket combinations shall fulfil the following requirements as applicable:	Not 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.	Pass.
	g) Metallic housings of plug/socket combinations shall be connected to the protective bonding circuit. PELV circuits are excepted from this requirement.	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	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.	Pass.
	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.	Pass.
	j) Plug/socket combinations used in control circuits shall fulfil the applicable requirements of IEC 61984. Exception: see item k).	Pass.
	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.	Not applicable
13.4.6	Dismantling for shipment	-
	If wiring needs to be disconnected for shipment, terminals or plug/socket combinations are provided at the disconnecting points	Pass. Internal wiring is located fully for shipment, and input terminal for power cords provided
13.4.7	Additional conductors	-
	Consideration should be given to providing additional conductors for maintenance or repair. Spare conductors shall be connected to spare terminals or isolated to prevent contact with live parts.	Not applicable
13.5	Ducts, connection boxes and other boxes	-
13.5.1	General requirements	-
	Min. protection degree for ducts: IP 33	
	All sharp edges, flash, burrs, rough surfaces or threads which the insulation of conductors may come into contact, removed from ducts and conduits	Edges smooth

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	In order to avoid confusion between conduits for electrical installation and those for oil, water or air, either physically separated or suitably identified	Pass. Physically separated
	Ducts or cable trays rigidly supported and positioned at sufficient distance from moving parts	Not applicable
	Ducts or cable trays mounted at least 2 meters above the working surface in areas where human passage is required	Not applicable. Not for human passage
	Ducts provided only for mechanical protection (see cl. 8.2.3)	Not applicable
	Cable trays which are partially covered, not to serve as cable trays or installation trunking	Not applicable
	Conductors and cables suitable for installation in cable trays	Not applicable
13.5.2	Percentage fill of ducts	-
	The dimensions and arrangement of the ducts be such as to facilitate the insertion of the conductors and cables	Not applicable
13.5.3	Rigid metal conduit and fittings	-
	Shall be of galvanized steel or of a corrosion-resistant material	Not applicable.No rigid metal conduit is used.
	Conduits shall be securely held in place and supported at each end	Not applicable. No rigid metal conduit is used.
	Fitting shall be threaded	Not applicable. No rigid metal conduit is used.
	Where threadless fittings are used, the conduit shall be securely fastened to the equipment	Not applicable. No rigid metal conduit is used.
	The conduit shall not be damage and the internal diameter of the conduit shall not e effectively reduced when it is bent	Not applicable. No rigid metal conduit is used.
13.5.4	Flexible metal conduit and fittings	-
	Flexible metallic conduits and fittings consist of flexible metal tubing or wire mesh armour.	Not applicable .Not used flexible metallic conduits
	They are suitable for its application and environmental conditions	Not applicable. Not used flexible metallic conduits
13.5.5	Flexible non-metal conduit and fittings	-
	Flexible non-metallic conduits are resistant to buckling and with	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	similar characteristics as the sheath of multicore cables	
	They shall be suitable for its application and environmental conditions	Not applicable
	Joints and fittings compatible with conduits and appropriate for its application	Not applicable
13.5.6	Cable trunking systems	Not applicable
	Shall be rigidly supported and clear of all moving or contaminating portions of the machine	No cable trunkling system is used.
	Covers shall be shaped to overlap the sides; gasket shall be permitted	No cable trunkling system is used.
	Covers shall be attached to cable trunking systems gy hinges or chain and held closed by means of captive screws or other suitable fasteners	No cable trunkling system is used.
	On horizontal cable trunking systems, the cover shall not be on the bottom	No cable trunkling system is used.
	Where the cable trunking system is furnished in sections, the joints between sections shall fit tightly but need not be gasketed	No cable trunkling system is used.
	The only openings permitted shall be those required for wiring or for drainage	No cable trunkling system is used.
	Cable trunking systems shall not have opened but unused knockouts	No cable trunkling system is used.
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. Conductors run in enclosed compartments and cable trunking systems shall be so secured and arranged that they are not subject to damage.	Not applicable
13.5.8	Connection boxes and other boxes	Pass.
	Cable connection boxes and junction boxes use for wiring purposes are readily accessible for maintenance (see cl. 11.3)	Pass. Readily accessible for maintenance
	They provide protection against ingress of solids or liquids, taking	Not applicable. Enclosed

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	into account external influences during operation of the machine (see cl. 11.3)	metal enclosure used except for hole for external cable connection and openings for vent.
	Junction boxes not have openings for cable entries and are designed so, as to avoid ingress of entrained dust, lubricants and coolant	Not applicable. Not used
13.5.9	Motor connection boxes	Pass.
	Shall enclose only connections to the motor and motor-mounted devices	Pass. They enclose only connections to the motor and motor-mounted devices.
14	**Electric motors and associated equipment**	-
14.1	General requirements	-
	Electric motor should conform to the requirements of IEC 60034-1	Pass.
	Electric motors and associated equipment protected against following risks:	
	overcurrent (see cl. 7.2)	Pass.
	thermal overload (see cl. 7.3)	Pass.
	overspeed (see cl. 7.6)	Not applicable
	Compliance ensured with the requirements stated (see clauses 5.3, 5.4, 5.5, 7.5, 7.6 and 9.4)	Pass.
	Motor control equipment shall be located and mounted according to clause 11	Not applicable
14.2	Motor enclosures	-
	Selection of motor enclosure recommended acc. to EN 60034-5	Pass. Conform to EN 60034-5
	Degree of protection at least IP23	IP54 applied
	Incorporated motors mounted such, as to provide adequate protection against mechanical damage	
14.3	Motor dimensions	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	Dimensions of motors conform to those given in IEC regulations (see EN 60072-1 and EN 60072-2)	Pass. conform to EN 60072-1 and EN 60072-2
14.4	Motor mounting and compartments	
	Each motor with associated coupling, belt, pulley or chain mounted such, as to provide adequate protection and easy access for inspection, maintenance, adjustment or alignment, lubrication and replacement	Not applicable
	Motors mounted such, as to allow easy access to all terminal boxes	Not applicable
	Motors mounted such, as to ensure proper cooling Temperature rise to be within limits of relevant insulation class	Not applicable
	Temperature rise within limits of relevant insulation class	Not applicable
	If possible, motor compartments stay clean and dry and when required, ventilated directly to the outside of the machine	Not applicable
	Motor-vents at an acceptable level and designed such, as to avoid ingress of swarf, dust or water spray	Not applicable
	No opening between motor compartment and any other compartment, which does not fulfil the requirement for motor compartments	Not applicable
14.5	Criteria for motor selection	Not applicable
	Electric motors selected acc. to service and environmental conditions	Not applicable
	Design criteria for evaluation include: type of motor and	Not applicable
	type of duty cycle (see IEC 60034-1) and	Not applicable
	fixed speed or variable speed operation and	Not applicable
	mechanical vibrations and	Not applicable
	type of converter for motor speed control and	Not applicable
	influence of the harmonic spectrum of voltage and/or current when supplied from static converter on the temperature rise and	Not applicable
	method of starting and possible influence of inrush current	Not applicable
	variation of counter torque load with time and speed	Not applicable
	influence of loads with large inertia and	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	influence of constant torque or constant power operation and	Not applicable
	possible need of inductive reactors between motor and converter	Not applicable
14.6	Protective devices for mechanical brakes	Not applicable
	Operation of overload or overcurrent protective devices for mechanical brake-actuators initiate simultaneous de-energisation(release) of associated machine actuators	Not applicable
15	**Accessories and lightning**	**Not applicable**
15.1	Accessories	Not applicable
	Where the machine or its associated equipment is provided with socket-outlets for auxiliary equipment, the following will apply:	Not applicable, No provided with socket-outlets
	the socket-outlets should conform to IEC 60309-1.	Not applicable
	if not possible, they are clearly marked with voltage and current ratings	Not applicable
	continuity of protective bonding circuit to be ensured	Not applicable
	all unearthed conductors connected to socket-outlets, protected against overcurrent	Not applicable
	when required, protection against overload in accordance with cl. 7.2 and cl. 7.3 separately from protection of other circuits	Not applicable
	if power supply to socket-outlets is not disconnected, than requirements of cl.5.3.5 apply	Not applicable
15.2	Local lighting of the machine and equipment	Not applicable
15.2.1	General	Not applicable
	Connections to the protective bonding circuit according to 8.2.2	Not applicable
	The ON-OFF switch shall not be incorporated in the lamp holder or in the flexible connecting cords	Not applicable
	Stroboscopic effects from lights shall be avoided	Not applicable
	Where fixed lighting is provided in an enclosure, electromagnetic compatibility should be taken into account using the principles outlined in 4.4.2.	Not applicable
15.2.2	Supply	Not applicable
	The nominal voltage of the local lighting circuit shall not exceed	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	250 V between conductors. A voltage not exceeding 50 V between conductors is recommended.	
	Lighting circuits supplied from one of the following sources:	-
	from a dedicated isolating transformer connected to load side, overcurrent protection provided in secondary circuit or	Not applicable
	a dedicated isolating transformer connected to line side provided, source permitted for maintenance purpose. lighting circuits placed in control enclosures only, overcurrent protection provided in secondary circuit or	Not applicable
	from a machine-circuit with dedicated overcurrent protection or	Not applicable
	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 disconnecting device (see also 13.1.3);	Not applicable
	an externally supplied lighting circuit (for example factory lighting supply).	Not applicable
15.2.3	Protection	Not applicable
	Local lighting shall be protected according to 7.2.6	Not applicable
15.2.4	Fittings	Not applicable
	Adjustable lighting fittings shall be suitable for the physical environment	Not applicable
	The lamp holders shall be: According to the relevant IEC publication; Constructed with an insulating material protection the lamp cap so as to prevent unintended contact	Not applicable
	Reflectors shall be supported by a bracket and not by the lamp holder	Not applicable
16	**Marking, warning signs and reference designations**	**Pass**
16.1	General	Pass.
	Warning signs, nameplates, markings, and identification plates of sufficient durability to withstand the physical environment involved	Pass. Comply with requirement

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
16.2	Warning signs	Pass.
16.2.1	Electric shock hazard	Pass.
	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: 	Pass.
	The warning sign shall be plainly visible on the enclosure door or cover	Pass. It is plainly visible on the enclosure.
	The warning sign may be omitted for:	-
	an enclosures equipped with a supply disconnecting device or	Not applicable .
	an operator machine interface or for a control station or	Pass.
	a single device with its own enclosure	Not applicable
16.2.2	Hot surfaces hazard	Not applicable
	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	Pass.
	Control devices, visual indicators and displays use for man - machine interfaces clearly and durably marked with regard to their functions either on, or adjacent to it	Pass. Marking clear and durable
	such markings as agreed between user and supplier	Pass.
	preference given to the use of standard symbols	Pass. According to standard
16.4	Marking of equipment	Pass.
	Equipment (for example controlgear assemblies) shall be legibly and durably marked in a way that is plainly visible after the equipment is installed.	Pass. They have been marked legibly and durably.
	A nameplate giving the following information shall be attached to the enclosure adjacent to each incoming supply:	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	name or trade mark of supplier;	Pass. See the nameplate
	certification mark, when required;	Pass. See the nameplate
	serial number, where applicable;	Not applicable
	rated voltage, number of phases and frequency (if a.c.), and full-load current for each supply;	Pass. See the nameplate
	short-circuit rating of the equipment;	Pass. See the nameplate
	main document number (see IEC 62023).	Not applicable
	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. See the nameplate
	Where only a single motor controller is used, that information may instead be provided on the machine nameplate where it is plainly visible.	Pass.
16.5	Reference designations	-
	All enclosures, assemblies, control devices, and components shall be plainly identified with the same reference designations as shown in the technical documentation	Pass. See circuit diagram
17	Technical documentation	Pass
17.1	General	Pass.
	The information necessary for installation, operation, and maintenance of the electrical equipment of a machine shall be supplied in the form of drawings, diagrams, charts, tales and instructions	Pass All the information have been provided by many forms in the instruction.
	The information shall be in an agreed language	Pass.In English.
	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	Pass.
	Information provided with electrical equipment shall include:	
	a) A main document (parts list or list of documents);	Pass.
	b) Complementary documents including:	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	1)a clear, comprehensive description of the equipment, installation and mounting, and the connection to the electrical supply(ies);	Pass. See instruction
	2) electrical supply(ies) requirements;	Pass. See instruction
	3) Information about the physical environment	Pass. See instruction
	4) Overview (block) diagram(s)	Pass. Provided by manufacturer
	5) Circuit / wiring diagram(s)	Pass.Provided by manufacturer
	6) information about:	-
	- programming, as necessary for use of the equipment;	Not applicable. Not used
	- Sequence of operation(s)	Pass. See instruction
	-Frequency of inspection	Pass. See instruction
	-Frequency and method of functional testing	Pass. See instruction
	-Guidance on the adjustment, maintenance and repair, particularly of the protective devices and circuits	Pass. See instruction
	-recommended spare parts list; and	Pass.See instruction
	-list of tools supplied.	Pass. See instruction
	7) Description of safeguards, interlocking functions and interlocking of separating safeguards for dangerous movements of co-ordinated operating machines	Pass. See instruction
	8) Description of safeguards and means provided for applications with to suspend the safeguards	Pass. See instruction
	9) instructions on the procedures for securing the machine for safe maintenance; (see also 17.8);	Pass.
	10) information on handling, transportation and storage;	Pass. See instruction
	11) information regarding load currents, peak starting currents and permitted voltage drops, as applicable;	Pass. See instruction
	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.	Pass. See instruction
17.3	Requirements applicable to all documentation	-
	Unless otherwise agreed between manufacturer and user:	-

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	the documentation shall be in accordance with relevant parts of IEC 61082;	Pass. Comply with requirements
	reference designations shall be in accordance with relevant parts of IEC 61346;	Pass. Comply with requirements
	instructions/manuals shall be in accordance with IEC 62079.	Pass. Comply with requirements
	parts lists where provided shall be in accordance with IEC 62027, class B.	Pass. Comply with requirements
	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	Not applicable
	-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	Pass.
	-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.	Not applicable
17.4	Installation documents	Pass.
	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. See instruction
	The recommended position, type, and cross-sectional areas of the supply cables to be installed on site shall be clearly indicated.	Pass. See instruction
	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. See instruction
	Where necessary, the size, purpose, and location of any ducts in the	Not applicable

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	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. See instruction
	Where necessary, the diagram shall indicate where space is required for the removal or servicing of the electrical equipment.	Pass. See instruction
	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.	Pass. See instruction
	Where the electrical equipment is intended to be operated from more than one source of electrical supply, the interconnection diagram or table shall indicate the modifications or interconnections required for the use of each supply.	Not applicable
17.5	Overview diagrams and function diagrams	Pass.
	Where it is necessary to facilitate the understanding of the principles of operation, an overview diagram shall be provided.	Pass. See instruction
	An overview diagram symbolically represents the electrical equipment together with its functional interrelationships without necessarily showing all of the interconnections.	Pass. See instruction
	Function diagrams may be provided as either part of, or in addition to, the overview diagram.	Pass. See instruction
17.6	Circuit diagrams	Pass.
	Circuit diagrams show the electrical circuits on the machine and its associated electrical equipment	Pass. See circuit diagram
	Any graphical symbol not shown in EN 60617 and EN 60417-1 must be separately shown and described on the wiring diagrams or supporting documents	Pass.See circuit diagram
	The symbols and identification of components consistent throughout all documents and on the machine	Pass.See circuit diagram
	Where appropriate, a diagram provided, showing the interface terminals and connections	Pass. See circuit diagram

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	The diagram shows a reference to the detailed circuit diagram of each unit	Pass. See circuit diagram
	Switch symbols shown on the circuit diagrams with all supplies turned off and with the machine and its electrical equipment in normal starting condition	Pass. See circuit diagram
	Conductors identified acc. to cl.13.2	Pass. See circuit diagram
	Characteristics relating to the function of the control device and components which are not evident from their symbolic representation, included on the diagrams adjacent to the symbol or referenced to a footnote	Pass. See circuit diagram
17.7	Operating manual	-
	Technical documentation containing an operating manual, outlining proper procedures for set-up and use of equipment	Pass. See instruction
	Particular attention given to safety measures provided and the improper methods of operation, that are anticipated	Pass. See instruction
	Detailed information provided on methods for equipment programming, program verification and additional safety procedures	Not applicable
17.8	Maintenance manual	-
	Technical documentation to contain a maintenance manual, detailing proper procedures for adjustment, servicing or preventive inspection and repair	Pass. See instruction
	Recommendations regarding maintenance or service records are part of it	Pass. See instruction
	Methods for the verification of proper operation provided	Pass. See instruction
17.9	Parts list	-
	The spare parts list comprises as a minimum information for ordering of spares or replacement of parts which are required for preventive or corrective maintenance and recommended spares	Pass. See part list
18	**Verification**	**Pass.**
18.1	General	Pass.
	This part of IEC 60204 gives general requirements for the electrical	Pass.

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict
	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;	Pass.
	b) in case of protection against indirect contact by automatic disconnection, conditions for protection by automatic disconnection shall be verified according to 18.2;	Pass.
	c) insulation resistance test (see 18.3);	Pass.
	d) voltage test (see 18.4);	Pass.
	e) protection against residual voltage (see 18.5);	Pass.
	f) functional tests (see 18.6).	Pass.
	When these tests are performed, it is recommended that they follow the sequence listed above.	Pass.
18.2	Verification of conditions for protection by automatic disconnection of supply	Pass.
18.2.1	General	Pass.
	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 supply are specified in 18.2.3.	Not TN-system
	For TT and IT systems, see IEC 60364-6-61.	Not applicable
18.2.2	Test methods in TN-systems	Not applicable
18.2.3	Application of the test methods for TN-systems	Not applicable
18.3	Insulation resistance tests	Pass.
	Insulation resistance measured with 500VDC between power circuit conductors and PE-circuit is to be =1.0 MΩ	Pass.(See appended table 18.3)
	Insulation value must be = 1.0 MΩ	Pass.(See appended table

EN 60204-1:2018+A1:2025		
Clause	Requirement	Result-Remark and Verdict

		18.3)
	Test made on individual sections of complete electrical installation	Pass.(See appended table 18.3)
	For certain parts of the electrical equipment, a lower minimum insulation value is permitted, but not less than 50 kΩ	Pass.
18.4	Voltage tests	Pass
	Test conditions : at least 1 second test voltage is twice the raged supply voltage of the equipment or 1000 V, whichever is greater frequency of 50/60 Hz supplied from a transformer with a min. rating of 500 VA shall not breakdown	Pass. 1000 V， 1min not breakdown.
18.5	Protection against residual voltages	Not applicable
	Tests shall be preformed to ensure complacence with 6.2.4	Not applicable
18.6	Functional test	Pass.
	The functions of electrical equipment shall be tested (particularly those related to safety and safeguarding)	Pass (See appended table 18.6)
18.7	Retesting	Not applicable
	Where a portion of the machine and its associated equipment is changed or modified, that portion shall ere verified and retested, as is appropriate	Not applicable

18.2	**TABLE: Continuity of the protective bonding circuit**	**P**

Location	Current(A)	Frequency(Hz)	Measured voltage(V)	Limit(V)
Between incoming PE terminal and relevant points that are part of the protective bonding circuit	10	50	0.137	1.0

18.3	**TABLE: Insulation resistance tests**			**P**
Location	Voltage(V) d.c	Frequency(Hz)	Time(s)	Measured insulation

				resistance(MΩ)
Between Ground wire and Electric control cabinet stainless steel plate	1000	---	60	19
Between Ground and Electric control cabinet back panel	1000	---	60	13
Between Ground and Grounding nail	1000	---	60	15

18.4	**TABLE: Voltage tests**	**P**

Test voltage applied between:	Test voltage (V) a.c. / d.c.	Breakdown Yes / No
AC current lineand ① and Neutral wire	1000 a.c., 50Hz, 60s	No
AC current lineand ② and Neutral wire	1000 a.c., 50Hz, 60s	No
AC current lineand ③ and Electric control cabinet back panel	1000 a.c., 50Hz, 60s	No

18.6	**TABLE: Function tests**	**P**

S/N	Function	requirement	Result
1	transmission parts checking	Suitable for intended use, no abnormal noise	OK
2	Speed variety for rotation parts moved by same bearing	<5%	2.5%
3	noise	<85dB	78dB
4	Completed product		OK

Annex：Technical Information

A.1 Photos


SPEED
00 km/h
0
0
ASSIST
ODO
00000 km


MACFOX


MACFOX


PY48V20~250W
25040127


Li-ion Battery Charger
MODEL:BC2674A6020
INPUT:100-240V~,2.8A (MAX.)
50/60Hz
OUTPUT:54.6V⎓2.0A
RoHS
CAUTION


BRUSHLESS MOTOR CONTROLLER
MODEL: ESF-A6
TC-YLH-M24-PV-2
Battery Voltage: 48V
Cutoff Voltage : 39V
Current Limit : 18A
Display Motrt : 5S
ELKM25X25060081


WARNING
Use only original MACFOX batteries and charger.
Non-original batteries or charger may cause fire or injury.
User assumes all responsibility.


MACFOX
WARNING
Model: EL-BP-07
LI-Ion BATTERY PACK
48V ⎓ 20.0Ah 960Wh
• Do not expose to temperature <-4°F(-20°C) or >122°F(50°C). Fully charge the battery and store separately if not in use for over 30 days. Fully charge it every 90 days, or the battery may self-discharge and be damaged.
• This damage is not covered by the Limited Warranty.
• Do not touch the terminals. Do not open/puncture. Avoid contacting with contents.
• Do not place in fire or puncture.
• Recycle or dispose of in accordance with local regulations.
• Charge with the original charger only.
• WARNING-To reduce the risk of injury, user must read instruction manual.
• AVERTISSEMENT-Pour prévenir les blessures, l'utilisateur doit lire le manuel d'utilisation.
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END OF REPORT