

Technical Construction File

File No: MD-TCF-24-01-2

Applicant:

Zhejiang Baolong Machinery Company Limited

Address of applicant:

No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing
Zone, Ruian City, Zhejiang, China



Directive: 2006/42/EC Machinery Directive
2014/35/EU Low Voltage Directive

Legal Person: _____

Product: Automatic Die-cutting Machine

Model: BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050EHT, BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH, BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS

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Part I : General

1.1 General description

In addition to the safety of the machinery mentioned above, the compliance of LVD directive is also an important part of putting CE mark on the machine.

In order to ensure the conformity for CE marking for these machines, some main European and/or International standards have been used to made assessment of conformity, they are:

EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 60204-1:2018 Safety of machinery - Electrical equipment of machines

EN 1010-1:2004+A1:2010 Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 1: Common requirements

**EN 1010-3:2002+A1:2009 Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 2: Printing and varnishing machines including pre-press machinery
- Part 1: General requirements**

The test reports for these applicable standards in detail have been included in the relevant sub-clauses of this technical construction file.

1.2 List of the series(Model) products

BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050EHT, BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH, BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS

1.3 Quality control system

In order to ensure the conformity of the series production, the Zhejiang Baolong Machinery Company Limited has taken the related procedures mentioned below:

- (1) Apply for the consultant from the qualified body in China.

The Wenzhou Baolong has applied for the consultant from OUCE who is a competent institute for the CE marking consultant and certification in Taiwan.

The complete technical construction file (TCF) have been established before applying for the CE

marking certificate under the consultant of OUCE .

- (2) Carry out the inspection for parts and components according to the TCF

Before the assemblies of the series production, the QC engineers of Wenzhou Baolong has to check and inspect the technical specifications and intended functions of parts and components to ensure the correct use of them according to the contents of TCF and principle described in the related technical information.

- (3) Carry out the inspection & testing for the products before packing

Before packing the products, the QC engineers of Wenzhou Baolong have to do the necessary inspection and testing to ensure the conformity of related requirements, in particularly, the testing and inspection of electrical characteristics and outer feature.

- (4) Carry out the inspection for the packing

After finishing the necessary inspection and testing for the products, an inspection for the packing has to be done to ensure the necessary elements being included in this packing before shipment.

- (5) Provision for the change of design

Any change of the products described in this TCF must be checked in detail and written down again in the TCF by the designer of Wenzhou Baolong, if the change may effects the related electrical or mechanical characteristics.

- (6) Provision for the Quality Assurance

For the provisions of internal control measures to ensure the conformity of series production of the machines, Wenzhou Baolong has built an internal quality control system in accordance with the international standard of ISO-9001.



EC DECLARATION OF CONFORMITY

*Applicant
(Owner of Declaration)*

Zhejiang Baolong Machinery Company Limited
No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone,
Ruian City, Zhejiang, China

Manufacturer

Zhejiang Baolong Machinery Company Limited
No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone,
Ruian City, Zhejiang, China

Trade Mark

BAOLONG

Product

Automatic Die-cutting Machine

Types / Models

BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050EHT,
BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH,
BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS

Serial Number

2023122501

Directive Applied

(2006/42/EC) MACHINERY DIRECTIVE (MD)
2014/35/EU Low Voltage Directive (LVD)

Related Standarts

EN ISO 12100: 2010
EN 60204-1:2018
EN 1010-1:2004+A1:2010
EN 1010-3:2002+A1:2009

We " ZHEJIANG BAOLONG MACHINERY COMPANY LIMITED" declare that our product mentioned above is in accordance with the (2006/42/EC) MACHINERY DIRECTIVE and 2014/35/EU Low Voltage Directive.

The person authorised to compile the technical file

Sign- Stamp
He Guang Yun

Name&Surname:

Title :

Manager

Date :

2023.12.25

Address :

Ruian, China



1.5 List of applicable regulations and standards

Regulations:

- Machinery Directive: 2006/42/EC
- LVD: 2014/35/EU

Standards:

EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 60204-1:2018 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN 1010-1:2004+A1:2010 Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 1: Common requirements

EN 1010-3:2002+A1:2009 Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 2: Printing and varnishing machines including pre-press machinery

TEST REPORT

Essential health and safety requirements

Name and address of the testing laboratory	Ouce International Certification and Inspection Group	
Name and address of the applicant	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the manufacturer	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the factory (production sites)	Zhejiang Baolong Machinery Company Limited No.32, Jixian Road, Shanghui Industrial District Zone, Wenzhou City,Zhejiang, China	
Product	Automatic Die-cutting Machine	
Mode/type reference	BL-1050E,BL-1050S,BL-1050SS,BL-1050ET,BL-1050EH,BL-1050EHT,BL-1050SH,BL-1050SHT,BL-1050ST,BL-1050FC,BL-1050FCH,BL-1050FCTH,BL-1300FCT,BL-1300FCTH,BL-1650S,BL-1650SS	
Tested according to	Essential health and safety requirements	
Test Result	PASS	
Test Report No.	MD-TCF-24-01-2-1	
Work carried out by	Joe ji	Signature
	Director	
Word verified by	Kevin Shi	Signature
	Manager	
Date of issue	2024/01/03	



Part II: Assessment of conformity**2.1 Essential health and safety requirements****ESSENTIAL REQUIREMENTS ACCORDING TO ANNEX I****MACHINERY SAFETY DIRECTIVE 2006/42/EC**

Article	Sub-article	Requirement	Fullfilment			Remark
			Y	N	N/A	
1	1.1.2	<p><i>Principles of safety integration</i></p> <p>(a) Machinery must be so constructed that it is fitted for its function, and can be adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen by the manufacturer. The aim of measures taken must be to eliminate any risk of accident throughout the foreseeable lifetime of the machinery, including the phases of assembly and dismantling, even where risks of accident arise from foreseeable abnormal situations.</p> <p>(b) In selecting the most appropriate methods, the manufacturer must apply the following principles, in the order given:</p> <ul style="list-style-type: none"> - eliminate or reduce risks as far as possible (inherently safe machinery design and construction), - take the necessary protection measures in relation to risks that cannot be eliminated, - inform users of the residual risks due to any shortcomings of the protection measures adopted, indicate whether any particular training is required and specify any need to provide personal protection equipment. <p>(c) When designing and constructing machinery, and when drafting the instructions, the manufacturer must envisage not only the normal use of the</p>				<p>Pass. All the machines are fitted for the function. Enough protection is provided</p> <p>-</p> <p>Pass Manufacturer has provided enough safety devices to eliminate or reduce risks..</p> <p>Pass. Safety guards and other devices are</p> <p>Pass. Enough warnings are provided in the appropriate</p> <p>Pass. All the conditions are</p>

		<p>machinery but also uses which could reasonably be expected. The machinery must be designed to prevent abnormal use if such use would engender a risk. In other cases the instructions must draw the user's attention to ways - which experience has shown might occur - in which the machinery should not be used.</p> <p>(d) Under the intended conditions of use, the discomfort, fatigue and psychological stress faced by the operator must be reduced to the minimum possible taking ergonomic principles into account.</p> <p>(e) When designing and constructing machinery, the manufacturer must take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protection equipment (such as footwear, gloves, etc.).</p> <p>(f) Machinery must be supplied with all the essential special equipment and accessories to enable it to be adjusted, maintained and used without risk.</p>			<p>considered by the manufacturer, and the related information also has Pass. These requirements have been complied with, and the related information also has been provided within the instruction manual.</p> <p>Pass. These requirements have been taken into account during the design of this machine</p>
1.1.3	<u>Materials and products</u>	<p>The materials used to construct machinery or products used and created during its use must not endanger exposed persons' safety or health. In particular, where fluids are used, machinery must be designed and constructed for use without risks due to filling, use, recovery or draining.</p>			<p>Pass. They cannot endanger exposed person's safety or health</p>
1.1.4	<u>Lighting</u>	<p>The manufacturer must supply integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity.</p> <p>The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to the lighting provided by the manufacturer.</p> <p>Internal parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting</p>			<p>Not applicable. No integral lighting has been used.</p> <p>Not applicable. No integral lighting has been used.</p> <p>Not applicable. No integral lighting has been used.</p>

1.1.5	<p><u>Design of machinery to facilitate its handling</u></p> <p>Machinery or each component part thereof must:</p> <ul style="list-style-type: none"> - be capable of being handled safely, - be packaged or designed so that it can be stored safely and without damage (e.g. adequate stability, special supports, etc.). <p>Where the weight, size or shape of machinery or its various component parts prevents them from being moved by hand, the machinery or each component part must;</p> <ul style="list-style-type: none"> - either be fitted with attachments for lifting gear, or - be designed so that it can be fitted with such attachments (e.g. threaded holes), or - be shaped in such a way that standard lifting gear can easily be attached. <p>Where machinery or one of its component parts is to be moved by hand, it must:</p> <ul style="list-style-type: none"> - either be easily movable, or - be equipped for picking up (e.g. hand-grips, etc.) and moving in complete safety. <p>Special arrangements must be made for the handling of tools and/or machinery parts, even if lightweight, which could be dangerous (shape, material, etc.).</p>				<p>-</p> <p>Pass. Enough measures have been taken to ensure the safe of the handling.</p> <p>Pass. The machine can be stored in wood box safely and without damage.</p> <p>Not applicable</p> <p>Not applicable</p> <p>Not applicable</p> <p>Not applicable</p> <p>Not applicable</p> <p>Not applicable</p> <p>Not applicable</p>
1.2	Controls				
1.2.1	<p><u>Safety and reliability of control systems</u></p> <p>Control systems must be designed and constructed so that they are safe and reliable, in a way that will prevent a dangerous situation arising.</p>				<p>Pass. The control system for</p>

		<p>Above all they must be designed and constructed in such a way that:</p> <ul style="list-style-type: none"> - they can withstand the rigours of normal use and external factors, - errors in logic do not lead to dangerous situations. 		<p>machine is safe and reliable by appropriate designing</p> <p>-</p> <p>Pass. The control system can withstand related effects during normal operation.</p> <p>Pass. Any error in logic doesn't lead to dangerous</p>
1.2.2		<p><u>Control devices</u></p> <p>Control devices must be:</p> <ul style="list-style-type: none"> - clearly visible and identifiable and appropriately marked where necessary, - positioned for safe operation without hesitation or loss of time, and without ambiguity, - designed so that the movement of the control is consistent with its effect, - located outside the danger zones, except for certain controls where necessary, such as emergency stop, console for training of robots, - positioned so that their operation cannot cause additional risk, 		<p>Pass. Appropriate lables and markings are provided This requirement has been complied with</p> <p>Pass. Appropriate positions have been taken into account during design.</p> <p>Pass. Movement of the control is consistent with its effect</p> <p>Pass. All control devices have been located outside the danger zones.</p> <p>Pass. All operation of control</p>

		<p>- designed or protected so that the desired effect, where a risk is involved, cannot occur without an intentional operation,</p> <p>- made so as to withstand foreseeable strain; particular attention must be paid to emergency stop devices liable to be subjected to considerable strain.</p> <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, etc.), the action to be performed must be clearly displayed and subject to confirmation where necessary. Controls must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles.</p> <p>Constraints due to the necessary or foreseeable use of personal protection equipment (such as footwear, gloves, etc.) must be taken into account. Machinery must be fitted with indicators (dials, signals, etc.) as required for safe operation. The operator must be able to read them from the control position</p> <p>From the main control position the operator must be able to ensure that there are no exposed persons in the danger zones. If this is impossible, the control system must be designed and constructed so that an acoustic and/ or visual warning signal is given whenever the machinery is about to start. The exposed person must have the time and the means to take rapid action to prevent the machinery starting up.</p>				<p>devices 'tcause additional</p> <p>Pass. ppropriate safety devices have been used to comply with this requirement.</p> <p>Pass. All of them can withstand foreseeable strain.</p> <p>Not applicable.</p> <p>Pass. These requirements have been taken into account during design.</p> <p>Not applicable.</p> <p>Pass. The indicators have been provided.</p> <p>Pass. Emergency stop , main switch and other related devices have been provided for the exposed person.</p>
	<p>1.2.3</p>	<p><u>Starting</u></p> <p>It must be possible to start machinery only by voluntary actuation of a control provided for the purpose.</p>				<p>Pass. Devices preventing</p>

		<p>The same requirement applies:</p> <ul style="list-style-type: none"> - when restarting the machinery after a stop-page, whatever the cause, - when effecting a significant change in the operating conditions (e.g. speed, pressure, etc.), <p>unless such restarting or change in operating conditions is without risk to exposed persons.</p> <p>This essential requirement does not apply to the restarting of the machinery or to the change in operating conditions resulting from the normal sequence of an automatic cycle.</p> <p>Where machinery has several starting controls and the operators can therefore put each other in danger, additional devices (e.g. enabling devices or selectors allowing only one part of the starting mechanism to be actuated at any one time) must be fitted to rule out such risks.</p> <p>It must be possible for automated plant functioning in automatic mode to be restarted easily after a stoppage once the safety conditions have been</p>			<p>strating have been provided.</p> <p>Pass. Reset is necessary before restarting.</p> <p>Pass. These requirements have been complied with.</p> <p>—</p> <p>Not applicable.</p> <p>Not applicable.</p>
<p>1.2.4</p>		<p><u>Stopping device</u></p> <p><u>Normal stopping</u></p> <p>Each machine must be fitted with a control whereby the machine can be brought safely to a complete stop.</p> <p>Each workstation must be fitted with a control to stop some or all of the moving parts of the machinery, depending on the type of hazard, so that the machinery is rendered safe. The machinery's stop control must have priority over the start controls..</p> <p>Once the machinery or its dangerous parts have stopped, the energy supply to the actuators concerned must be cut off</p>			<p>Pass. A normal stop control has been provided.</p> <p>Pass. It has priority over the start control.</p> <p>Pass.</p>

						The stops belong to the category 0, or
		<p><u>Emergency stop</u> Each machine must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted.</p> <p>The following exceptions apply:</p> <ul style="list-style-type: none"> - machines in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken, - hand-held portable machines and hand-guided machines. <p>This device must:</p> <ul style="list-style-type: none"> - have clearly identifiable, clearly visible and quickly accessible controls, - stop the dangerous process as quickly as possible, without creating additional hazards, - where necessary, trigger or permit the triggering of certain safeguard movements. <p>Once active operation of the emergency stop control has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting.</p>				<p>Pass. These machines are fitted with one emergency stop —</p> <p>Not applicable.</p> <p>Not applicable. —</p> <p>Pass. The emergency stop has red button, yellow background and marked with “emergency Pass. The emergency stop will stop the machine as soon as it is pressed and it will not create any additional Not applicable.</p>
		<u>Complex installations</u>				—

		In the case of machinery or parts of machinery designed to work together, the manufacturer must so design and construct the machinery that the stop controls, including the emergency stop, can stop not only the machinery itself but also all equipment upstream and/or downstream if its continued operation can be dangerous.				Not applicable.
1.2.5	<i>Mode selection</i>	<p>The control mode selected must override all other control systems with the exception of the emergency stop.</p> <p>If machinery has been designed and built to allow for its use in several control or operating modes presenting different safety levels (e.g. to allow for adjustment, maintenance, inspection, etc.), it must be fitted with a mode selector which can be locked in each position. Each position of the selector must correspond to a single operating or control mode.</p> <p>The selector may be replaced by another selection method which restricts the use of certain functions of the machinery to certain categories of operator (e.g. access codes for certain numerically controlled functions, etc.).</p> <p>If, for certain operations, the machinery must be able to operate with its protection devices neutralised, the mode selector must simultaneously:</p> <ul style="list-style-type: none"> - disable the automatic control mode, - permit movements only by controls requiring sustained action, - permit the operation of dangerous moving parts only in enhanced safety conditions (e.g. reduced speed, reduced power, step-by-step, or other adequate provision) while preventing hazards from linked sequences, - prevent any movement liable to pose a danger by acting voluntarily or involuntarily on the machine's internal sensors. <p>In addition, the operator must be able to control operation of the parts he is working on at the adjustment point.</p>				<p>Pass. The emergency stop is effective regardless of operating modes.</p> <p>Not applicable. No this kind of modeselectionhas been found</p> <p>Not applicable. No this kind of mode selection has been found</p> <p>Not applicable. No this kind of mode selection has been found.</p> <p>Not applicable. No this kind of mode selection has been found.</p> <p>Not applicable. No this kind of mode selection has been found.</p> <p>Not applicable. No this kind of mode selection has been found.</p> <p>Not applicable. No this kind of mode selection has been found.</p> <p>Not applicable. No this kind of mode selection has been found.</p>

						selection has been found.
	1.2.6	<p><u>Failure of the power supply</u></p> <p>The interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply to the machinery must not lead to a dangerous situation.</p> <p>In particular:</p> <ul style="list-style-type: none"> - the machinery must not start unexpectedly, - the machinery must not be prevented from stopping if the command has already been given, - no moving part of the machinery or piece held by the machinery must fall or be ejected, - automatic or manual stopping of the moving parts whatever they may be must be unimpeded, - the protection devices must remain fully effective. 				<p>—</p> <p>Pass. No any dangerous situation has been found.</p> <p>—</p> <p>Pass. The stop command has the priority over all other devices</p> <p>Pass. No such part is found.</p>
	1.2.7	<p><u>Failure of the control circuit</u></p> <p>A fault in the control circuit logic, or failure of or damage to the control circuit must not lead to dangerous situations.n particular:</p> <ul style="list-style-type: none"> - the machinery must not start unexpectedly, - the machinery must not be prevented from stopping if the command has already been given, - no moving part of the machinery or piece held by the machinery must fall or be ejected, - automatic or manual stopping of the moving parts whatever they may be must be unimpeded, 				

		- the protection devices must remain fully effective.				
	1.2.8	<u>Software</u> Interactive software between the operator and the command or control system of a machine must be user-friendly.				
	1.3	Protection against mechanical hazards				-
	1.3.1	Stability Machinery, components and fittings thereof must be so designed and constructed that they are stable enough, under the foreseen operating conditions (if necessary taking climatic conditions into account) for use without risk of overturning, falling or unexpected movement. If the shape of the machinery itself or its intended installation does not offer sufficient stability, appropriate means of anchorage must be incorporated and indicated in the instructions.				- Pass. These requirements have been taken into account design Not applicable. The sufficient stability has been offered for
	1.3.2	<u>Risk of break-up during operation</u> The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used as foreseen by the manufacturer. phenomena of fatigue, ageing, corrosion and abrasion. The durability of the materials used must be adequate for the nature of the work place foreseen by the manufacturer, in particular as regards the The manufacturer must indicate in the instructions the type and frequency of inspection and maintenance required for safety reasons. He must, where appropriate, indicate the parts subject to wear and the criteria for replacement. Where a risk of rupture or disintegration remains despite the measures taken (e.g. as with grinding wheels) the moving parts must be mounted and positioned in such a way that in case of rupture their fragments will be				Pass. All parts of the machine can withstand related stress when they are used. Pass. All materials used for this machine are appropriate for their intended use and have adequate life. Pass. The related information has been provided within the instruction manual. Not applicable. No such risk is possible.

	<p>contained.</p> <p>Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected against all manner of external stresses and strains; precautions must be taken to ensure that no risk is posed by a rupture (sudden movement, high-pressure jets, etc.). Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to the persons exposed (e.g. tool breakage):</p> <ul style="list-style-type: none"> - when the workpiece comes into contact with the tool the latter must have attained its normal working conditions, - when the tool starts and/or stops (intentionally or accidentally) the feed movement and the tool movement must be coordinated. 				<p>Not applicable.</p> <p>Pass.</p> <p>Pass.</p>
1.3.3	<p><u>Risks due to falling or ejected objects</u></p> <p>Precautions must be taken to prevent risks from falling or ejected objects (e.g. workpieces, tools, cuttings, fragments, waste, etc.).</p>				
1.3.4	<p><u>Risks due to surfaces, edges or angles</u></p> <p>In so far as their purpose allows, accessible parts of the machinery must have no sharp edges, no sharp angles, and no rough surfaces likely to cause injury.</p>				<p>—</p> <p>Pass. No this kind injury has been found.</p>
1.3.5	<p><u>Risks related to combined machinery</u></p> <p>Where the machinery is intended to carry out several different operations with the manual removal of the piece between each operation (combined machinery), it must be designed and constructed in such a way as to enable each element to be used separately without the other elements constituting a danger or risk for the exposed person.</p> <p>For this purpose, it must be possible to start and stop separately any elements that are not protected.</p>				<p>—</p> <p>Not applicable. No this kind of combined machinery.</p> <p>Not applicable. No this kind of combined machinery.</p>

1.3.6	<p><u>Risks relating to variations in the rotational speed of tools</u></p> <p>When the machine is designed to perform operations under different conditions of use (e.g. different speeds or energy supply), it must be designed and constructed in such a way that selection and adjustment of these conditions can be carried out safely and reliably.</p>				<p>—</p> <p>Not applicable.</p>
1.3.7	<p><u>Prevention of risks related to moving parts</u></p> <p>The moving parts of machinery must be designed, built and laid out to avoid hazards or, where hazards persist, fixed with guards or protective devices in such a way as to prevent all risk of contact which could lead to accidents.</p> <p>All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work.</p>				<p>—</p> <p>Pass. This kind of hazards have been prevented by appropriate guards.</p> <p>Pass. All necessary steps have been taken.</p>
	<p>In cases where, despite the precautions taken, a blockage is likely to occur, specific protection devices or tools, the instruction handbook and possibly a sign on the machinery should be provided by the manufacturer to enable the equipment to be safely unblocked.</p>				<p>Not applicable. No this kind of need.</p>
1.3.8	<p><u>Choice of protection against risks related to moving parts</u></p> <p>Guards or protection devices used to protect against the risks related to moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help make the choice.</p> <p><u>A. Moving transmission parts</u></p> <p>Guards designed to protect exposed persons against the risks associated with moving transmission parts (such as pulleys, belts, gears, rack and pinions, shafts, etc.) must be:</p> <ul style="list-style-type: none"> - either fixed, complying with requirements 1.4.1 and 1.4.2.1, or - movable, complying with requirements 1.4.1 and 1.4.2.2.A. 				<p>—</p> <p>Pass. It is in accordance with the risk assessment.</p> <p>See the related clauses. See the related clauses.</p>

		Movable guards should be used where frequent access is foreseen.				
		<p><u>B. Moving parts directly involved in the process</u></p> <p>Guards or protection devices designed to protect exposed persons against the risks associated with moving parts contributing to the work (such as cutting tools, moving parts of presses, cylinders, parts in the process of being machined, etc.) must be:</p> <ul style="list-style-type: none"> - wherever possible fixed guards complying with requirements 1.4.1 and 1.4.2.1, - otherwise, movable guards complying with requirements 1.4.1 and 1.4.2.2.B or protection devices such as sensing devices (e.g. non-material barriers, sensor mats), remote-hold protection devices (e.g. two-hand controls), or protection devices intended automatically to prevent all or part of the operator's body from encroaching on the danger zone in accordance with requirements 1.4.1 and 1.4.3. <p>However, when certain moving parts directly involved in the process cannot be made completely or partially inaccessible during operation owing to operations requiring nearby operator intervention, where technically possible such parts must be fitted with:</p> <ul style="list-style-type: none"> - fixed guards, complying with requirements 1.4.1 and 1.4.2.1 preventing access to those sections of the parts that are not used in the work, - adjustable guards, complying with requirements 1.4.1 and 1.4.2.3 restricting access to those sections of the moving parts that are strictly for the work. 				
	1.4	<u>Required characteristics of guards and protection devices</u>				
	1.4.1	<p><u>General requirements</u></p> <p>Guards and protection devices must:</p> <ul style="list-style-type: none"> - be of robust construction, - not give rise to any additional risk, 				<p>Pass. They all can be opened only with tools. Not applicable.</p>

		<ul style="list-style-type: none"> - not be easy to by-pass or render non-operational, - be located at an adequate distance from the danger zone, - cause minimum obstruction to the view of the production process, - enable essential work to be carried out on installation and/or replacement of tools and also for maintenance by restricting access only to the area where the work has to be done, if possible without the guard or protection device having to be dismantled. 				Not applicable.
1.4.2		<u>Special requirements for guards</u>				
1.4.2.1		<u>Fixed guards</u> Fixed guards must be securely held in place. They must be fixed by systems that can be opened only with tools. Where possible, guards must be unable to remain in place without their fixings.				
1.4.2		<u>Movable guards</u>				
1.4.2.2		<u>A. Type A movable guards must</u> <ul style="list-style-type: none"> - as far as possible remain fixed to the machinery when open, - be associated with a locking device to prevent moving parts starting up as long as these parts can be accessed and to give a stop command whenever they are no longer closed. 				
1.4.2		<u>B. Type B movable guards must be designed and incorporated into the</u>				
1.4.2.2		<u>control system so that:</u> <ul style="list-style-type: none"> - moving parts cannot start up while they are within the operator's reach, - the exposed person cannot reach moving parts once they have started up, - they can be adjusted only by means of an intentional action, such as the use of a tool, key, etc., - the absence or failure of one of their components prevents starting or stops the moving parts, - protection against any risk of ejection is proved by means of an appropriate barrier. 				

1.4.2		<u>Adjustable guards restricting access</u>				
	1.4.2.3	Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must: - be adjustable manually or automatically according to the type of work involved, - be readily adjustable without the use of tools, - reduce as far as possible the risk of ejection.				
	1.4.3	<u>Special requirements for protection devices</u> Protection devices must be designed and incorporated into the control system so that:				
		- moving parts cannot start up while they are within the operator's reach,				
		- the exposed person cannot reach moving parts once they have started up, - they can be adjusted only by means of an intentional action, such as the use of a tool, key, etc., - the absence or failure of one of their components prevents starting or stops the moving parts.				
1.5	1.5.1	<u>Protection against other hazards</u> <u>Electricity supply</u> Where machinery has an electricity supply it must be designed, constructed and equipped so that all hazards of an electrical nature are or can be prevented. The specific rules in force relating to electrical equipment designed for use within certain voltage limits must apply to machinery which is subject to those limits.				
	1.5.2	<u>Static electricity</u> Machinery must be so designed and constructed as to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system.				
	1.5.3	<u>Energy supply other than electricity</u>				

		Where machinery is powered by an energy other than electricity (e.g. hydraulic, pneumatic or thermal energy, etc.), it must be so designed, constructed and equipped as to avoid all potential hazards associated with these types of energy.				
	1.5.4	<p><u>Errors of fitting</u></p> <p>Errors, likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design of such parts or, failing this, by information given on the parts themselves and/or the housings.</p> <p>The same information must be given on moving parts and/or their housings where the direction of movement must be known to avoid a risk.</p> <p>Any further information that may be necessary must be given in the instructions.</p> <p>Where a faulty connection can be the source of risk, incorrect fluid connections, including electrical conductors, must be made impossible by the design or, failing this, by information given on the pipes, cables, etc. and/or connector blocks.</p>				
	1.5.5	<p><u>Extreme temperatures</u></p> <p>Steps must be taken to eliminate any risk of injury caused by contact with or proximity to machinery parts or materials at high or very low temperatures.</p> <p>The risk of hot or very cold material being ejected should be assessed. Where this risk exists, the necessary steps must be taken to prevent it or, if this is not technically possible, to render it non-dangerous.</p>				
	1.5.6	<p><u>Fire</u></p> <p>Machinery must be designed and constructed to avoid all risk of fire or overheating posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.</p>				
	1.5.7	<p><u>Explosion</u></p> <p>Machinery must be designed and constructed to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.</p> <p>To that end the manufacturer must take steps to:</p> <ul style="list-style-type: none"> - avoid a dangerous concentration of products, - prevent combustion of the potentially explosive atmosphere, 				

		<p>- minimise any explosion which may occur so that it does not endanger the surroundings.</p> <p>The same precautions must be taken if the manufacturer foresees the use of the machinery in a potentially explosive atmosphere.</p> <p>Electrical equipment forming part of the machinery must conform, as far as the risk from explosion is concerned, to the provision of the specific Directives in force.</p>				
	1.5.8	<p><u>Noise</u></p> <p>Machinery must be so designed and constructed that risks resulting from the emission of airborne noise are reduced to the lowest level taking account of technical progress and the availability of means of reducing noise, in particular at source.</p>				
	1.5.9	<p><u>Vibration</u></p> <p>Machinery must be so designed and constructed that risks resulting from vibrations produced by the machinery are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.</p>				
	1.5.10	<p><u>Radiation</u></p> <p>Machinery must be so designed and constructed that any emission of radiation is limited to the extent necessary for its operation and that the effects on exposed persons are non-existent or reduced to non-dangerous proportions.</p>				
	1.5.11	<p><u>External radiation</u></p> <p>Machinery must be so designed and constructed that external radiation does not interfere with its operation.</p>				
	1.5.12	<p><u>Laser equipment</u></p> <p>Where laser equipment is used, the following provisions should be taken into account:</p> <ul style="list-style-type: none"> - laser equipment on machinery must be designed and constructed so as to prevent any accidental radiation, - laser equipment on machinery must be protected so that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health, 				

		- optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by the laser rays.				
	1.5.13	<p><u>Emissions of dust, gases, etc</u></p> <p>Machinery must be so designed, constructed and/or equipped that risks due to gases, liquids, dust, vapours and other waste materials which it produces can be avoided.</p> <p>Where a hazard exists, the machinery must be so equipped that the said substances can be contained and/or evacuated.</p> <p>Where machinery is not enclosed during normal operation, the devices for containment and/or evacuation must be situated as close as possible to the source emission.</p>				<p>Adequate design and construction have been taken</p> <p>All the condition has been considered</p>
	1.5.14	<p><u>Risk of being trapped in a machine</u></p> <p>Machinery must be designed, constructed or fitted with a means of preventing an exposed person from being enclosed within it or, if that is impossible, with a means of summoning help.</p>				
	1.5.15	<p><u>Risk of slipping, tripping or falling</u></p> <p>Parts of the machinery where persons are liable to move about or stand must be designed and constructed to prevent persons slipping, tripping or falling on or off these parts.</p>				
	1.6	<u>Maintenance</u>				
	1.6.1	<p><u>Machinery maintenance</u></p> <p>Adjustment, lubrication and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair, cleaning and servicing operations while machinery is at a standstill.</p> <p>If one or more of the above conditions cannot be satisfied for technical reasons, these operations must be possible without risk (see 1.2.5).</p> <p>In the case of automated machinery and, where necessary, other machinery, the manufacturer must make provision for a connecting device for mounting diagnostic fault-finding equipment.</p> <p>Automated machine components which have to be changed frequently, in particular for a change in manufacture or where they are liable to wear or likely to deteriorate following an accident, must be capable of being removed and replaced easily and in safety. Access to the components must enable these tasks to be carried out with the necessary technical means (tools,</p>				

		measuring instruments, etc.) in accordance with an operating method specified by the manufacturer.				
	1.6.2	<p><u>Access to operating position and servicing points</u></p> <p>The manufacturer must provide means of access (stairs, ladders, catwalks, etc.) to allow access in safety to all areas used for production, adjustment and maintenance operations.</p>				Appropriate guards and safety control device have been used
	1.6.3	<p><u>Isolation of energy sources</u></p> <p>All machinery must be fitted with means to isolate it from all energy sources. Such isolators must be clearly identified.</p> <p>They must be capable of being locked if reconnection could endanger exposed persons. In the case of machinery supplied with electricity through a plug capable of being plugged into a circuit, separation of the plug is sufficient.</p> <p>The isolator must be capable of being locked also where an operator is unable, from any of the points to which he has access, to check that the energy is still cut off.</p> <p>After the energy is cut off, it must be possible to dissipate normally any energy remaining or stored in the circuits of the machinery without risk to exposed persons.</p> <p>As an exception to the above requirements, certain circuits may remain connected to their energy sources in order, for example, to hold parts, protect information, light interiors, etc. In this case, special steps must be taken to ensure operator safety.</p>				The power switch has been used
	1.6.4	<p><u>Operator intervention</u></p> <p>Machinery must be so designed, constructed and equipped that the need for operator intervention is limited.</p> <p>If operator intervention cannot be avoided, it must be possible to carry it out easily and in safety.</p>				
	1.6.5	<p><u>Cleaning of internal parts</u></p> <p>The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is absolutely impossible to avoid entering the machinery, the manufacturer must take steps during its construction to</p>				

		allow cleaning to take place with the minimum of danger.				
1.7		<u>Indicators</u>				
1.7.0		<u>Information devices</u> <p>The information needed to control machinery must be unambiguous and easily understood. It must not be excessive to the extent of overloading the operator. Where the health and safety of exposed persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped to give an appropriate acoustic or light signal as a warning.</p>				
1.7.1		<u>Warning devices</u> <p>Where machinery is equipped with warning devices (such as signals, etc.), these must be unambiguous and easily perceived. The operator must have facilities to check the operation of such warning devices at all times. The requirements of the specific Directives concerning colours and safety signals must be complied with.</p>				
1.7.2		<u>Warning of residual risks</u> <p>Where risks remain despite all the measures adopted or in the case of potential risks which are not evident (e.g. electrical cabinets, radioactive sources, bleeding of a hydraulic circuit, hazard in an unseen area, etc.), the manufacturer must provide warnings. Such warnings should preferably use readily understandable pictograms and/or be drawn up in one of the languages of the country in which the machinery is to be used, accompanied, on request, by the languages understood by the operators.</p>				
1.7.3		<u>Marking</u> <p>All machinery must be marked legibly and indelibly with the following minimum particulars: - name and address of the manufacturer,</p>				

	<ul style="list-style-type: none"> - the CE marking (see Annex III), - designation of series or type, - serial number, if any, - the year of construction. <p>Furthermore, where the manufacturer constructs machinery intended for use in a potentially explosive atmosphere, this must be indicated on the machinery.</p> <p>Machinery must also bear full information relevant to its type and essential to its safe use (e.g. maximum speed of certain rotating parts, maximum diameter of tools to be fitted, mass, etc.).</p> <p>Where a machine part must be handled during use with lifting equipment, its mass must be indicated legibly, indelibly and unambiguously.</p> <p>The interchangeable equipment referred to in the third indent of <u>Article 1(2)(a)</u>, must bear the same information.</p>				
1.7.4	<p><u>Instructions</u></p> <p>(a) All machinery must be accompanied by instructions including at least the following:</p> <ul style="list-style-type: none"> - a repeat of the information with which the machinery is marked, except the serial number (see 1.7.3) together with any appropriate additional information to facilitate maintenance (e.g. addresses of the importer, repairers, etc.), - foreseen use of the machinery within the meaning of 1.1.2(c), - workstation(s) likely to be occupied by operators, - instructions for safe: <ul style="list-style-type: none"> - putting into service, - use, - handling, giving the mass of the machinery and its various parts where they are regularly to be transported separately, - assembly, dismantling, 				User manual in English provided

- adjustment

- maintenance (servicing and repair),
- where necessary, training instructions,
- where necessary, the essential characteristics of tools which may be fitted to the machinery.

Where necessary, the instructions should draw attention to ways in which the machinery should not be used.

(b) The instructions must be drawn up in one of the Community languages by the manufacturer or his authorised representative established in the Community.

On being put into service, all machinery must be accompanied by a translation of the instructions in the language or languages of the country in which the machinery is to be used and by the instructions in the original language. This translation must be done either by the manufacturer or his authorised representative established in the Community or by the person introducing the machinery into the language area in question.

By way of derogation from this requirement, the maintenance instructions for use by specialised personnel employed by the manufacturer or his authorised representative established in the Community may be drawn up in only one of the Community languages understood by that personnel.

(c) The instructions must contain the drawings and diagrams necessary for putting into service, maintenance, inspection, checking of correct operation and, where appropriate, repair of the machinery, and all useful instructions in particular with regard to safety.

(d) Any literature describing the machinery must not contradict the instructions as regards safety aspects. The technical documentation describing the machinery must give information regarding the airborne noise emissions referred to in (f) and, in the case of hand-held and/or hand-guided machinery, information regarding vibration as referred to in 2.2.

(e) Where necessary, the instructions must give the requirements relating to installation and assembly for reducing noise or vibration (e.g. use of dampers, type and mass of foundation block, etc.).

(f) The instructions must give the following information concerning airborne noise emissions by the machinery, either the actual value or a value established on the basis of measurements made on identical machinery:

- equivalent continuous A-weighted sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this

	<p>fact must be indicated,</p> <ul style="list-style-type: none"> - peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 mPa), - sound power level emitted by the machinery where the equivalent continuous A-weighted sound pressure level at workstations exceeds 85 dB(A). <p>In the case of very large machinery, instead of the sound power level, the equivalent continuous sound pressure levels at specified positions around the machinery may be indicated.</p> <p>Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery.</p> <p>The manufacturer must indicate the operating conditions of the machinery during measurement and what methods have been used for the measurement.</p> <p>Where the workstation(s) are undefined or cannot be defined, sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1,60 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated.</p> <p>(g) If the manufacturer foresees that the machinery will be used in a potentially explosive atmosphere, the instructions must give all the necessary information.</p> <p>(h) In the case of machinery which may also be intended for use by non-professional operators, the wording and layout of the instructions for use, whilst respecting the other essential requirements mentioned above, must take into account the level of general education and acumen that can reasonably be expected from such operators.</p>				
<p>Technical construction file shall be retained and kept available for the competent national authorities for at least 10 years following the date of manufacture of the machinery or of the last unit produced.</p>					
<p>Safety measures for fulfilling the product conformity requirements</p> <ul style="list-style-type: none"> - Critical components shall be checked for every purchasing order if it is comply with the critical component list and relevant conformance and requirements are considered during incoming inspection. - Production flow chart and quality control plans 					

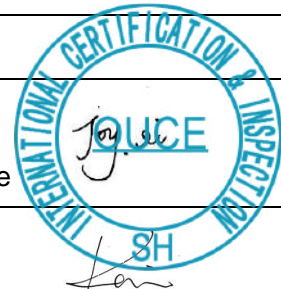
- Regulatory compliance records for the released machinery. (Availability and compliance)

- ▣ Relevant warning signs
- ▣ CE Conformity mark
- ▣ User manual
- ▣ Relevant circuit diagrams
- ▣ Relevant accessories, tools and apparatus
- ▣ Functional tests
- ▣ Mechanical tests
- ▣ Electrical safety tests

TEST REPORT

EN ISO 12100:2010 Safety of machinery- Safety of machinery – General principles for design, risk assessment and risk reduction

Name and address of the testing laboratory	Ouce International Certification and Inspection Group	
Name and address of the applicant	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the manufacturer	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the factory (production sites)	Zhejiang Baolong Machinery Company Limited No.32, Jixian Road, Shanghui Industrial District Zone, Wenzhou City, Zhejiang, China	
Product	Automatic Die-cutting Machine	
Mode/type reference	BL-1050E,BL-1050S,BL-1050SS,BL-1050ET,BL-1050EH, BL-1050EHT,BL-1050SH,BL-1050SHT,BL-1050ST,BL-1050FC, BL-1050FCH,BL-1050FCTH,BL-1300FCT,BL-1300FCTH,BL-1650S, BL-1650SS	
Tested according to	BS EN ISO 12100:2010	
Test Result	PASS	
Test Report No.	MD-TCF-24-01-2-2	
Work carried out by	JoeJi	Signature
	Director	
Word verified by	Kevin Shi	Signature
	Manager	
Date of issue	2024/01/03	



Part III: Test report**3.1 BS EN ISO 12100 test report**

BS EN ISO 12100:2010				
Clause	Requirement	Test	Result - Remark	Verdict
6	Risk reduction			
6.1	General			
	<p>The objective of risk reduction can be achieved by the elimination of hazards, or by separately or simultaneously reducing each of the two elements that determine the associated risk:</p> <ul style="list-style-type: none"> _ severity of harm from the hazard under consideration; _ probability of occurrence of that harm. <p>All protective measures intended for reaching this objective shall be applied in the following sequence, referred to as the three-step method (see also Figures 1 and 2).</p>		This requirement is complied with.	Pass
6.2	Inherently safe design measures			
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.</p>		Appropriate machine design has been performed by the manufacturer.	Pass
	<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.</p> <p>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).</p>		Appropriate machine design has been performed by the manufacturer.	Pass

6.2.2	Consideration of geometrical factors and physical aspects		
6.2.2.1	Geometrical factors		Pass
	Such factors include the following.		
	<p>a) The form of machinery is designed to maximize direct visibility of the working areas and hazard zones from the control position — reducing blind spots, for example — and choosing and locating means of indirect vision where necessary (mirrors, etc.) so as to take into account the characteristics of human vision, particularly when safe operation requires permanent direct control by the operator, for example:</p> <ul style="list-style-type: none"> _ 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. <p>The design of the machine shall be such that, from the main control position, the operator is able to ensure that there are no exposed persons in the danger zones.</p>	Appropriate machine design has been performed by the manufacturer.	Pass
	<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).</p>	Appropriate machine design has been performed by the manufacturer.	Pass
	<p>c) Avoiding sharp edges and corners, protruding parts:</p> <p>in so far as their purpose allows, accessible parts of the machinery shall have no sharp edges, no sharp angles, no rough surfaces, no</p>	Appropriate machine design has been performed by the manufacturer.	Pass

	<p>protruding parts likely to cause injury, and no openings which can “trap” parts of the body or clothing. In particular, sheet metal edges shall be deburred, flanged or trimmed, and open ends of tubes which can cause a “trap” shall be capped.</p>		
	<p>d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).</p>	<p>Appropriate machine design has been performed by the manufacturer.</p>	<p>Pass</p>
6.2.2.2	<p>Physical aspects</p>		-
	<p>Such aspects include the following:</p>		-
	<p>a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard;</p>	<p>The actuating force has been limited to be a sufficiently low value so that the actuated part does not generate a mechanical hazard.</p>	<p>Pass</p>
	<p>b) limiting the mass and/or velocity of the movable elements, and hence their kinetic energy;</p>	<p>The mass and/or velocity of the movable elements, and hence their kinetic energy have been limited.</p>	<p>Pass</p>
	<p>c) limiting the emissions by acting on the characteristics of the source using measures for reducing</p> <ol style="list-style-type: none"> 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 	<p>The emissions by acting on the characteristics of the source have been limited.</p>	<p>Pass</p>

	<p>of grinding), and</p> <p>4) radiation emissions, including, for example, avoiding the use of hazardous radiation sources, limiting the power of radiation to the lowest level sufficient for the proper functioning of the machine, designing the source so that the beam is concentrated on the target, increasing the distance between the source and the operator or providing for remote operation of the machinery</p> <p>[measures for reducing emission of non-ionizing radiation are given in 6.3.4.5 (see also EN 12198-1 and EN 12198-3)]</p>		
6.2.3	Taking into account general technical knowledge of machine design		
	This general technical knowledge can be derived from technical specifications for design (standards, design codes, calculation rules, etc.), which should be used to cover		
	a) mechanical stresses such as		
	- stress limitation by implementation of correct calculation, construction and fastening methods as regards, for example, bolted assemblies and welded assemblies,	The appropriate technical knowledge of mechanical has been taken into account.	Pass
	- stress limitation by overload prevention (bursting disk, pressure-limiting valves, breakage points, torque-limiting devices, etc.),	The appropriate technical knowledge of mechanical has been taken into account.	Pass
	- avoiding fatigue in elements under variable stresses (notably cyclic stresses),	The appropriate technical knowledge of mechanical has been taken into account.	Pass
	- static and dynamic balancing of rotating elements,	The appropriate technical knowledge	Pass

		of mechanical has been taken into account.	
	b) materials and their properties such as		
	- resistance to corrosion, ageing, abrasion and wear,	The materials have been treated by appropriate methods.	Pass
	- hardness, ductility, brittleness,	The materials have been treated by appropriate methods.	Pass
	- homogeneity,	The materials have been treated by appropriate methods.	Pass
	- toxicity,	The materials have been treated by appropriate methods.	Pass
	- flammability	The materials have been treated by appropriate methods.	Pass
	c) emission values for		
	- noise,	No noise will result in hazard in this machine.	Pass
	- vibration,	No vibration will result in hazard in this machine.	Pass
	- hazardous substances,	No hazardous substances will result in hazard in this machine.	Pass
	- radiation	No radiation will result in hazard in this machine.	Pass
	When the reliability of particular components or assemblies is critical for safety (for example, ropes, chains, lifting accessories for lifting loads or persons), stress limits shall be multiplied by appropriate working coefficients.	Appropriate working coefficients have been taken into account during design and	Pass

		calculation.	
6.2.4	Choice of appropriate technology		
	One or more hazards can be eliminated or risks reduced by the choice of the technology to be used in certain applications such as the following:		
	a) on machines intended for use in explosive atmospheres, using <ul style="list-style-type: none"> - appropriately selected pneumatic or hydraulic control system and machine actuators, - intrinsically safe electrical equipment (see IEC 60079-11); 	Not applicable.	N/A
	b) for particular products to be processed (for example, by a solvent), by using equipment that ensures the temperature will remain far below the flash point;	Not applicable.	N/A
	c) the use of alternative equipment to avoid high noise levels, such as <ul style="list-style-type: none"> - electrical instead of pneumatic equipment, - in certain conditions, water-cutting instead of mechanical equipment. 	The appropriate technology has been chosen.	Pass
6.2.5	Applying principle of positive mechanical action		
	Positive mechanical action is achieved when a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements. An example of this is positive opening operation of switching devices in an electrical circuit (see IEC 60947-5-1 and ISO 14119).	The principle of the positive mechanical action of a component on another component has been applied.	Pass
6.2.6	Provisions for stability		
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use.	These machines have been designed to have sufficient stability to allow them to be used safely in their specified conditions	Pass

		of use.	
	Factors to be taken into account include		
	- the geometry of the base,	The factor has been taken into account during design.	Pass
	- the weight distribution, including loading,	The factor has been taken into account during design.	Pass
	- the dynamic forces due to movements of parts of the machine, of the machine itself or of elements held by the machine which can result in an overturning moment,	The factor has been taken into account during design.	Pass
	- vibration	The factor has been taken into account during design.	Pass
	- oscillations of the centre of gravity,	Not applicable.	N/A
	- characteristics of the supporting surface in case of travelling or installation on different sites (ground conditions, slope, etc.),	The factor has been taken into account during design.	Pass
	- external forces, such as wind pressure and manual forces.	The factor has been taken into account during design.	Pass
	Stability shall be considered in all phases of the life cycle of the machine, including handling, travelling, installation, use, dismantling, disabling and scrapping.	The factor has been taken into account during design.	Pass
	Other protective measures for stability relevant to safeguarding are given in 6.3.2.6.	Please see the related clause.	Pass
6.2.7	Provisions for maintainability		
	When designing a machine, the following maintainability factors shall be taken into account to enable maintenance of the machine:		
	- accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used;	The factor has been taken into account during design.	Pass
	- ease of handling, taking into account human	The factor has been	Pass

	capabilities;	taken into account during design.	
	- limitation of the number of special tools and equipment.	The factor has been taken into account during design.	Pass
6.2.8	Observing ergonomic principles		
	Ergonomic principles shall be taken into account in designing machinery so as to reduce the mental or physical stress of, and strain on, the operator.	Appropriate ergonomic principles have been taken into account in designing machinery to reduce mental or physical stress and strain of the operator.	Pass
	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.	Pass
	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.	Pass
	All elements of the operator-machine interface, such as controls, signalling or data display elements, shall be designed to be easily understood so that clear and unambiguous interaction between the operator and the machine is possible. See EN 614-1, EN 13861 and IEC 61310-1.	All arrangement and design of manual controls have been checked in compliance with.	Pass
	The designer's attention is particularly drawn to following ergonomic aspects of machine design.		-
	a) Avoid the necessity for stressful postures and movements during the use of the machine (for example, providing facilities to adjust the machine to suit the various operators).	Stressful postures and movements during use of the machine have been	Pass

		avoided.	
	b) Design machines, especially hand-held and mobile machines, so as to enable them to be operated easily, taking into account human effort, actuation of controls and hand, arm and leg anatomy.	This machine has been adjusted to the human strength and convenient movement.	Pass
	c) Limit as far as possible noise, vibration and thermal effects such as extreme temperatures.	This machine has been designed with low noise, vibration.	Pass
	d) Avoid linking the operator's working rhythm to an automatic succession of cycles.		Pass
	e) Provide local lighting on or in the machine for the illumination of the working area and of adjusting, setting-up and frequent maintenance zones when the design features of the machine and/or its guards render the ambient lighting inadequate. Flicker, dazzling, shadows and stroboscopic effects shall be avoided if they can cause a risk. If the position or the lighting source has to be adjusted, its location shall be such that it does not cause any risk to persons making the adjustment.	All these factors have been taken into account during design.	Pass
	f) Select, locate and identify manual controls (actuators) so that		-
	- they are clearly visible and identifiable, and appropriately marked where necessary (see 6.4.4),	All design and arrangement of the control logic have been checked in compliance with this requirement.	Pass
	- they can be safely operated without hesitation or loss of time and without ambiguity (for example, a standard layout of controls reduces the possibility of error when an operator changes from a machine to another one of similar type having the same pattern of	All design and arrangement of the control logic have been checked in compliance with this requirement.	Pass

	operation),		
	- their location (for push-buttons) and their movement (for levers and hand wheels) are consistent with their effect (see IEC 61310-3),	All the function has been checked in compliance with this requirement.	Pass
	- their operation cannot cause additional risk.		Pass
	Where a control is designed and constructed to perform several different actions — namely, where there is no one-to-one correspondence (for example, keyboards) — the action to be performed shall be clearly displayed and subject to confirmation where necessary.		N/A
	Controls shall be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Constraints due to the necessary or foreseeable use of personal protective equipment (such as footwear, gloves) shall be taken into account.	All the arrangement of the control logic have been checked in compliance with this requirement.	Pass
	g) Select, design and locate indicators, dials and visual display units so that		
	- they fit within the parameters and characteristics of human perception,		Pass
	- information displayed can be detected, identified and interpreted conveniently, i.e. long-lasting, distinct, unambiguous and understandable with respect to the operator's requirements and the intended use,		Pass
	- the operator is able to perceive them from the control position.		Pass
6.2.9	Electrical hazards		
	For the design of the electrical equipment of machines, IEC 60204-1 gives general provisions about disconnection and switching of electrical circuits and for protection against electric shock.	Please also make reference to EN 60204-1 test report.	Pass
	For requirements related to specific machines,		N/A

	see corresponding IEC standards (for example, IEC 61029, IEC 60745 or IEC 60335).		
6.2.10	Pneumatic and hydraulic hazards		-
	Pneumatic and hydraulic equipment of machinery shall be designed so that		
	- the maximum rated pressure cannot be exceeded in the circuits (using, for example, pressure-limiting devices),	This requirement is complied with.	Pass
	- no hazard results from pressure fluctuations or increases, or from loss of pressure or vacuum,	This requirement is complied with.	Pass
	- no hazardous fluid jet or sudden hazardous movement of the hose (whiplash) results from leakage or component failures,	This requirement is complied with.	Pass
	- air receivers, air reservoirs or similar vessels (such as in gas-loaded accumulators) comply with the applicable design standard codes or regulations for these elements,	This requirement is complied with.	Pass
	- all elements of the equipment, especially pipes and hoses, are protected against harmful external effects,	This requirement is complied with.	Pass
	- as far as possible, reservoirs and similar vessels (for example, gas-loaded accumulators) are automatically depressurized when isolating the machine from its power supply (see 6.3.5.4) and, if not possible, means are provided for their isolation, local depressurizing and pressure indication (see also ISO 14118:2000, Clause 5),	This requirement is complied with.	Pass
	- all elements which remain under pressure after isolation of the machine from its power supply are provided with clearly identified exhaust devices, and there is a warning label drawing attention to the necessity of depressurizing those elements before any setting or maintenance activity on the machine.	This requirement is complied with.	Pass
6.2.11	Applying inherently safe design measures to control systems		-

6.2.11.1	General		-
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061).	Inherently safe design measures to control system have applied.	Pass
	The correct design of machine control systems can avoid unforeseen and potentially hazardous machine behaviour.		Pass
	Typical causes of hazardous machine behaviour are		
	- an unsuitable design or modification (accidental or deliberate) of the control system logic,	No this kind of hazard in this machine	Pass
	- a temporary or permanent defect or failure of one or several components of the control system,	No this kind of hazard in this machine	Pass
	- a variation or a failure in the power supply of the control system,	No this kind of hazard in this machine	Pass
	- inappropriate selection, design and location of the control devices.	No this kind of hazard in this machine	Pass
	Typical examples of hazardous machine behaviour are		
	- unexpected start-up (see ISO 14118),	No this kind of hazard in this machine	Pass
	- uncontrolled speed change,	No this kind of hazard in this machine	Pass
	- failure to stop moving parts,	No this kind of hazard in this machine	Pass
	- dropping or ejection of part of the machine or of a workpiece clamped by the machine,	No this kind of hazard in this machine	Pass
	- machine action resulting from inhibition (defeating or failure) of protective devices.	No this kind of hazard in this machine	Pass
	In order to prevent hazardous machine behaviour and to achieve safety functions, the design of control systems shall comply with the principles and methods presented in this	The design of control systems comply with the related principles and methods	Pass

	<p>subclause (6.2.11) and in 6.2.12.</p> <p>These principles and methods shall be applied singly or in combination as appropriate to the circumstances</p> <p>(see ISO 13849-1, IEC 60204-1 and IEC 62061).</p>		
	<p>Control systems shall be designed to enable the operator to interact with the machine safely and easily. This requires one or several of the following solutions:</p>		
	<p>- systematic analysis of start and stop conditions;</p>	<p>Systematic analysis have been applied.</p>	<p>Pass</p>
	<p>- provision for specific operating modes (for example, start-up after normal stop, restart after cycle interruption or after emergency stop, removal of the workpieces contained in the machine, operation of a part of the machine in case of a failure of a machine element);</p>	<p>Enough provisions have been provided.</p>	<p>Pass</p>
	<p>- clear display of the faults;</p>		<p>Pass</p>
	<p>- measures to prevent accidental generation of unexpected start commands (for example, shrouded start device) likely to cause dangerous machine behaviour (see ISO 14118:2000, Figure 1);</p>	<p>Main switch with lock and related devices are provided.</p>	<p>Pass</p>
	<p>- maintained stop commands (for example, interlock) to prevent restarting that could result in dangerous machine behaviour (see ISO 14118:2000, Figure 1).</p>	<p>This requirement is complied with.</p>	<p>Pass</p>
	<p>An assembly of machines may be divided into several zones for emergency stopping, for stopping as a result of protective devices and/or for isolation and energy dissipation. The different zones shall be clearly defined and it shall be obvious which parts of the machine belong to which zone. Likewise, it shall be obvious which control devices (for example, emergency stop devices, supply disconnecting devices) and/or protective devices belong to which zone. The interfaces between zones shall be designed such that no function in one zone creates hazards in another zone which</p>		<p>N/A</p>

	has been stopped for an intervention.		
	Control systems shall be designed to limit the movements of parts of the machinery, the machine itself, or work pieces and/or loads held by the machinery, to the safe design parameters (for example, range, speed, acceleration, deceleration, load capacity). Allowance shall be made for dynamic effects (swinging of loads, etc.).	This requirement is complied with.	Pass
6.2.11.2	Starting of an internal power source/switching on an external power supply		
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.	Please also make reference to EN 60204-1 test report.	Pass
6.2.11.3	Starting/stopping of a mechanism		
	The primary action for starting or accelerating the movement of a mechanism should be performed by the application or an increase of voltage or fluid pressure, or — if binary logic elements are considered — by passage from state 0 to state 1 (where state 1 represents the highest energy state).	This requirement has been taken into account during design.	Pass
	The primary action for stopping or slowing down should be performed by removal or reduction of voltage or fluid pressure, or — if binary logic elements are considered — by passage from state 1 to state 0 (where state 1 represents the highest energy state)		Pass
	In certain applications, such as high-voltage switchgear, this principle cannot be followed, in which case other measures should be applied to achieve the same level of confidence for the stopping or slowing down.		N/A
	When, in order for the operator to maintain permanent control of deceleration, this principle is not observed (for example, a hydraulic braking device of a self-propelled mobile machine), the machine shall be equipped with a means of slowing and		Pass

	stopping in case of failure of the main braking system.		
6.2.11.4	Restart after power interruption		
	If a hazard could be generated, the spontaneous restart of a machine when it is re-energized after power interruption shall be prevented (for example, by use of a self-maintained relay, contactor or valve).		Pass
6.2.11.5	Interruption of power supply		
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply. At least the following requirements shall be met:	The hazardous situations resulting from interruption or excessive fluctuation of the power supply has been prevented.	Pass
	- the stopping function of the machinery shall remain;		Pass
	- all devices whose permanent operation is required for safety shall operate in an effective way to maintain safety (for example, locking, clamping devices, cooling or heating devices, power-assisted steering of self-propelled mobile machinery);		Pass
	- parts of machinery or workpieces and/or loads held by machinery which are liable to move as a result of potential energy shall be retained for the time necessary to allow them to be safely lowered.		Pass
6.2.11.6	Use of automatic monitoring		
	Automatic monitoring is intended to ensure that a safety function or functions implemented by a protective measure do not fail to be performed if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed such that hazards are generated.	Appropriate automatic monitoring has been used.	Pass
	Automatic monitoring either detects a fault immediately or carries out periodic checks so that a fault is detected before the next demand	Appropriate automatic monitoring has been used.	Pass

	upon the safety function. In either case, the protective measure can be initiated immediately or delayed until a specific event occurs (for example, the beginning of the machine cycle).		
	The protective measure may be, for example,		-
	- the stopping of the hazardous process,		Pass
	- preventing the restart of this process after the first stop following the failure,		Pass
	- the triggering of an alarm.		Pass
6.2.11.7	Safety functions implemented by programmable electronic control systems		-
6.2.11.7.1	General		-
	A control system that includes programmable electronic equipment (for example, programmable controllers) can, where appropriate, be used to implement safety functions at machinery. Where a programmable electronic control system is used, it is necessary to consider its performance requirements in relation to the requirements for the safety functions. The design of the programmable electronic control system shall be such that the probability of random hardware failures and the likelihood of systematic failures that can adversely affect the performance of the safety-related control function(s) is sufficiently low. Where a programmable electronic control system performs a monitoring function, the system behaviour on detection of a fault shall be considered (see also the IEC 61508 series for further guidance).		N/A
	The programmable electronic control system should be installed and validated to ensure that the specified performance [for example, safety integrity level (SIL) in IEC 61508] for each safety function has been achieved. Validation comprises testing and analysis (for example, static, dynamic or failure		N/A

	analysis) to show that all parts interact correctly to perform the safety function and that unintended functions do not occur.		
6.2.11.7.2	Hardware aspects		
	<p>The hardware (including, for example, sensors, actuators and logic solvers) shall be selected, and/or designed and installed, to meet both the functional and performance requirements of the safety function(s) to be performed, in particular, by means of</p> <ul style="list-style-type: none"> - architectural constraints (the configuration of the system, its ability to tolerate faults, its behaviour on detection of a fault, etc.), - selection, and/or design, of equipment and devices with an appropriate probability of dangerous random hardware failure, and - the incorporation of measures and techniques within the hardware so as to avoid systematic failures and control systematic faults. 		N/A
6.2.11.7.3	Software aspects		
	<p>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).</p> <p>Application software should not be reprogrammable by the user. This may be achieved by use of embedded software in a non-reprogrammable memory [for example, micro-controller, application-specific integrated circuit (ASIC)].</p> <p>When the application requires reprogramming by the user, the access to the software dealing with safety functions should be restricted (for example, by locks or passwords for the authorized persons).</p>		N/A
6.2.11.8	Principles relating to manual control		
	a) Manual control devices shall be designed and located according to the relevant	This requirement has been taken into	Pass

	ergonomic principles given in 6.2.8, item f).	account during design.	
	b) A stop control device shall be placed near each start control device. Where the start/stop function is performed by means of a hold-to-run control, a separate stop control device shall be provided when a risk can result from the hold-to-run control device failing to deliver a stop command when released.	A stop control device has been placed near each start control device.	Pass
	c) Manual controls shall be located out of reach of the danger zones (see IEC 61310-3), except for certain controls where, of necessity, they are located within a danger zone, such as emergency stop or teach pendant.	Manual controls have been located out of reach of the danger zones.	Pass
	d) Whenever possible, control devices and control positions shall be located so that the operator is able to observe the working area or hazard zone.		Pass
	e) If it is possible to start the same hazardous element by means of several controls, the control circuit shall be so arranged that only one control is effective at a given time. This applies especially to machines which can be manually controlled by means of, among others, a portable control unit (such as a teach pendant), with which the operator can enter danger zones.	Not applicable.	N/A
	f) Control actuators shall be designed or guarded so that their effect, where a risk is involved, cannot occur without intentional operation (see ISO 9355-1, ISO 9355-3 and ISO 447).		Pass
	g) For machine functions whose safe operation depends on permanent, direct control by the operator, measures shall be implemented to ensure the presence of the operator at the control position (for example, by the design and location of control devices).		Pass

	h) For cableless control, an automatic stop shall be performed when correct control signals are not received, including loss of communication (see IEC 60204-1).	Not applicable.	N/A
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		
	Where, for setting, teaching, process changeover, fault-finding, cleaning or maintenance of machinery, a guard has to be displaced or removed and/or a protective device has to be disabled, and where it is necessary for the purpose of these operations for the machinery or part of the machinery to be put into operation, the safety of the operator shall be achieved using a specific control mode which simultaneously	Not applicable.	N/A
	a) disables all other control modes,	Not applicable.	N/A
	b) permits operation of the hazardous elements only by continuous actuation of an enabling device, a two-hand control device or a hold-to-run control device,	Not applicable.	N/A
	c) permits operation of the hazardous elements only in reduced risk conditions (for example, reduced speed, reduced power/force, step-by-step, for example, with a limited movement control device),	Not applicable.	N/A
	d) prevents any operation of hazardous functions by voluntary or involuntary action on the machine's sensors.	Not applicable.	N/A
6.2.11.10	Selection of control and operating modes		
	If machinery has been designed and built to allow for its use in several control or operating modes requiring different protective measures and/or work procedures (for example, to allow for adjustment, setting, maintenance, inspection), it shall be fitted with a mode selector which can be locked in each position. Each position of the selector shall be	This requirement is complied with.	Pass

	clearly identifiable and shall exclusively allow one control or operating mode.		
	The selector may be replaced by another selection means which restricts the use of certain functions of the machinery to certain categories of operators (for example, access codes for certain numerically controlled functions).	This requirement is complied with.	Pass
6.2.11.11	Applying measures to achieve electromagnetic compatibility (EMC)		
	For guidance on electromagnetic compatibility, see IEC 60204-1 and IEC 61000-6.	C	N/A
6.2.11.12	Provision of diagnostic systems to aid fault-finding		
	Diagnostic systems to aid fault-finding should be included in the control system so that there is no need to disable any protective measure.		Pass
6.2.12	Minimizing probability of failure of safety functions		
6.2.12.1	General		
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine. The continued operation of the safety functions is essential for the safe use of the machine. This can be achieved by the measures given in 6.2.12.2 to 6.2.12.4.		Pass
6.2.12.2	Use of reliable components		
	Reliable components” means components which are capable of withstanding all disturbances and stresses associated with the usage of the equipment in the conditions of intended use (including the environmental conditions), for the period of time or the number of operations fixed for the use, with a low probability of failures generating a hazardous malfunctioning of the machine. Components shall be selected taking into account all factors mentioned above (see also 6.2.13).	Reliable components have been used.	Pass

6.2.12.3	Use of “oriented failure mode” components		
	“Oriented failure mode” components or systems are those in which the predominant failure mode is known in advance and which can be used so that the effect of such a failure on the machine function can be predicted.		N/A
6.2.12.4	Duplication (or redundancy) of components or subsystems		
	In the design of safety-related parts of the machine, duplication (or redundancy) of components may be used so that, if one component fails, another component or components continue to perform the respective function(s), thereby ensuring that the safety function remains available.	Not applicable.	N/A
	In order to allow the proper action to be initiated, component failure shall be detected by automatic monitoring (see 6.2.11.6) or in some circumstances by regular inspection, provided that the inspection interval is shorter than the expected lifetime of the components.	Not applicable.	N/A
	Diversity of design and/or technology can be used to avoid common cause failures (for example, from electromagnetic disturbance) or common mode failures.	Not applicable.	N/A
6.2.13	Limiting exposure to hazards through reliability of equipment		
	Increased reliability of all component parts of machinery reduces the frequency of incidents requiring intervention, thereby reducing exposure to hazards.	This requirement is complied with.	Pass
	This applies to power systems (operative part, see Annex A) as well as to control systems, and to safety functions as well as to other functions of machinery.	This requirement is complied with.	Pass
	Safety-related components (for example, certain sensors) of known reliability shall be used.	This requirement is complied with.	Pass
	The elements of guards and of protective	This requirement is	Pass

	devices shall be especially reliable, as their failure can expose persons to hazards, and also because poor reliability would encourage attempts to defeat them.	complied with.	
6.2.14	Limiting exposure to hazards through mechanization or automation of loading (feeding)/ unloading (removal) operations		
	Mechanization and automation of machine loading/unloading operations and, more generally, of handling operations — of workpieces, materials or substances — limits the risk generated by these operations by reducing the exposure of persons to hazards at the operating points.	This requirement is complied with.	Pass
	Automation can be achieved by, for example, robots, handling devices, transfer mechanisms and air-blast equipment. Mechanization can be achieved by, for example, feeding slides, push-rods and hand-operated indexing tables.	This requirement has been complied with by design.	Pass
	While automatic feeding and removal devices have much to offer in preventing accidents to machine operators, they can create danger when any faults are being corrected. Care shall be taken to ensure that the use of these devices does not introduce further hazards, such as trapping or crushing, between the devices and parts of the machine or workpieces/materials being processed. Suitable safeguards (see 6.3) shall be provided if this cannot be ensured.	This requirement has been complied with by design.	Pass
	Automatic feeding and removal devices with their own control systems and the control system of the associated machine shall be interconnected after thorough study of how all safety functions are performed in all the control and operation modes of the entire equipment.	This requirement has been complied with by design.	Pass
6.2.15	Limiting exposure to hazards through location of setting and maintenance points outside danger zones		

	The need for access to danger zones shall be minimized by locating maintenance, lubrication and setting points outside these zones.		Pass
6.3	Safeguarding and complementary protective measures		
6.3.1	General		
	Guards and protective devices shall be used to protect persons whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks. Complementary protective measures involving additional equipment (for example, emergency stop equipment) may have to be implemented. NOTE The different kinds of guards and protective devices are defined in 3.27 and 3.28.		Pass
6.3.2	Selection and implementation of guards and protective devices		
6.3.2.1	General		
	This subclause gives guidelines for the selection and the implementation of guards and protective devices the primary purpose of which is to protect persons against hazards generated by moving parts, according to the nature of those parts (see Figure 4) and to the need for access to the danger zone(s).		Pass
	The exact choice of a safeguard for a particular machine shall be made on the basis of the risk assessment for that machine.		Pass
	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 the access of an operator into a danger zone is not required during the normal operation (operation without malfunction) of the machinery.		Pass
	As the need for frequency of access increases, this inevitably leads to the fixed guard not	Movable interlocking guard is used.	Pass

	being replaced. This requires the use of an alternative protective measure (movable interlocking guard, sensitive protective equipment).		
	A combination of safeguards can sometimes be required. For example, where, in conjunction with a fixed guard, a mechanical loading (feeding) device is used to feed a workpiece into a machine, thereby removing the need for access to the primary hazard zone, a trip device can be required to protect against the secondary drawing-in or shearing hazard between the mechanical loading (feeding) device, when reachable, and the fixed guard.		N/A
	Consideration shall be given to the enclosure of control positions or intervention zones to provide combined protection against several hazards including	This requirement has been taken in to consideration.	Pass
	a) hazards from falling or ejected objects, using, for example, protection in the form of a falling object protection structure (FOPS),	No such hazards exist in this machine.	Pass
	b) emission hazards (protection against noise, vibration, radiation, substances hazardous to health, etc.),	No such hazards exist in this machine.	Pass
	c) hazards due to the environment (protection against heat, cold, foul weather, etc.),	No such hazards exist in this machine.	Pass
	d) hazards due to tipping over or rolling over of machinery, using, for example, protection in the form of roll-over or tip-over protection structures (ROPS and TOPS).	No such hazards exist in this machine.	Pass
	The design of enclosed work stations, such as cabs and cabins, shall take into account ergonomic principles concerning visibility, lighting, atmospheric conditions, access, posture.	Ergonomic principles have been taken into account during design.	Pass
6.3.2.2	Where access to the hazard zone is not required during normal operation		

	Where access to the hazard zone is not required during normal operation of the machinery, safeguards should be selected from the following:		
	a) fixed guards (see also ISO 14120);	Fixed guards are provided.	Pass
	b) interlocking guards with or without guard locking (see also 6.3.3.2.3, ISO 14119 and ISO 14120);	Not applicable.	N/A
	c) self-closing guards (see ISO 14120:2002, 3.3.2);	Not applicable.	N/A
	d) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496) or pressure-sensitive protective devices (see ISO 13856).	Not applicable.	N/A
6.3.2.3	Where access to the hazard zone is required during normal operation		
	Where access to the hazard zone is required during normal operation of the machinery, safeguards should be selected from the following:		
	a) interlocking guards with or without guard locking (see also ISO 14119, ISO 14120 and 6.3.3.2.3 of this document); b) sensitive protective equipment, such as electrosensitive protective equipment (see IEC 61496); c) adjustable guards; d) self-closing guards (see ISO 14120:2002, 3.3.2); e) two-hand control devices (see ISO 13851); f) interlocking guards with a start function (control guard) (see 6.3.3.2.5).	Not applicable.	N/A
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault-finding, cleaning or maintenance		
	As far as possible, machines shall be designed so that the safeguards provided for the protection of the production operator also	Not applicable.	N/A

	<p>ensure the protection of personnel carrying out setting, teaching, process changeover, fault-finding, cleaning or maintenance, without hindering them in the performance of their task. Such tasks shall be identified and considered in the risk assessment as parts of the use of the machine (see 5.2).</p>		
6.3.2.5	Selection and implementation of sensitive protective equipment ¹⁾		
6.3.2.5.1	Selection		
	<p>Due to the great diversity of the technologies on which their detection function is based, all types of sensitive protective equipment are far from being equally suitable for safety applications. The following provisions are intended to provide the designer with criteria for selecting, for each application, the most suitable device(s).</p>	Not applicable.	N/A
	<p>Types of sensitive protective equipment include</p> <ul style="list-style-type: none"> - light curtains, - scanning devices, for example, laser scanners, - pressure-sensitive mats, and - trip bars, trip wires. 	Not applicable.	N/A
	<p>Sensitive protective equipment can be used</p> <ul style="list-style-type: none"> - for tripping purposes, - for presence sensing, - for both tripping and presence sensing, or - to re-initiate machine operation — a practice subject to stringent conditions. 	Not applicable.	N/A
	<p>The following characteristics of the machinery, among others, can preclude the sole use of sensitive protective equipment:</p> <ul style="list-style-type: none"> - tendency for the machinery to eject materials or component parts; - necessity to guard against emissions (noise, 	Not applicable.	N/A

	<p>radiation, dust, etc.);</p> <ul style="list-style-type: none"> - erratic or excessive machine stopping time; - inability of a machine to stop part-way through a cycle. 		
6.3.2.5.2	Implementation		
	<p>Consideration should be given to</p> <ul style="list-style-type: none"> a) the size, characteristics and positioning of the detection zone (see ISO 13855, which deals with the positioning of some types of sensitive protective equipment), b) the reaction of the device to fault conditions (see IEC 61496 for electrosensitive protective equipment), c) the possibility of circumvention, and d) detection capability and its variation over the course of time (as a result, for example, of its susceptibility to different environmental conditions such as the presence of reflecting surfaces, other artificial light sources and sunlight or impurities in the air). 	Not applicable.	N/A
	<p>Sensitive protective equipment shall be integrated in the operative part and associated with the control system of the machine so that</p> <ul style="list-style-type: none"> - a command is given as soon as a person or part of a person is detected, - the withdrawal of the person or part of a person detected does not, by itself, restart the hazardous machine function(s), and therefore the command given by the sensitive protective equipment is maintained by the control system until a new command is given, - 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, - the machine cannot operate during interruption of the detection function of the sensitive protective equipment, except during 	Not applicable.	N/A

	<p>muting phases, and</p> <ul style="list-style-type: none"> - the position and the shape of the detection field prevents, possibly together with fixed guards, a person or part of a person from entering or being present in the hazard zone without being detected. 		
6.3.2.5.3	<p>Additional requirements for sensitive protective equipment when used for cycle initiation</p>		
	<p>In this exceptional application, the starting of the machine cycle is initiated by the withdrawal of a person or of the detected part of a person from the sensing field of the sensitive protective equipment, without any additional start command, hence deviating from the general requirement given in the second point of the dashed list in 6.3.2.5.2, above. After switching on the power supply, or when the machine has been stopped by the tripping function of the sensitive protective equipment, the machine cycle shall be initiated only by voluntary actuation of a start control.</p>	Not applicable.	N/A
	<p>Cycle initiation by sensitive protective equipment shall be subject to the following conditions:</p>	Not applicable.	N/A
	<p>a) only active optoelectronic protective devices (AOPDs) complying with IEC 61496 series shall be used;</p>	Not applicable.	N/A
	<p>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;</p>	Not applicable.	N/A
	<p>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;</p>	Not applicable.	N/A

	d) entering the sensing field of the AOPD(s) or opening interlocking guards is the only way to enter the hazard zone;	Not applicable.	N/A
	e) if there is more than one AOPD safeguarding the machine, only one of the AOPDs is capable of cycle re-initiation;	Not applicable.	N/A
	f) with regard to the higher risk resulting from automatic cycle initiation, the AOPD and the associated control system comply with a higher safety-related performance than under normal conditions.	Not applicable.	N/A
6.3.2.6	Protective measures for stability		
	If stability cannot be achieved by inherently safe design measures such as weight distribution (see 6.2.6), it shall be maintained by the use of protective measures such as		
	- anchorage bolts,		Pass
	- locking devices,		Pass
	- movement limiters or mechanical stops,		Pass
	- acceleration or deceleration limiters,		N/A
	- load limiters,		Pass
	- alarms warning of the approach to stability or tipping limits.		N/A
6.3.2.7	Other protective devices		
	When a machine requires continuous control by the operator (for example, mobile machines, cranes) and an error of the operator can generate a hazardous situation, this machine shall be equipped with the necessary devices to enable the operation to remain within specified limits, in particular	Not applicable.	N/A
	- when the operator has insufficient visibility of the hazard zone,	Not applicable.	N/A
	- when the operator lacks knowledge of the actual value of a safety-related parameter (distance, speed, mass, angle, etc.),	Not applicable.	N/A
	- when hazards can result from operations other than those controlled by the operator.	Not applicable.	N/A

	The necessary devices include		
	<p>a) devices for limiting parameters of movement (distance, angle, velocity, acceleration),</p> <p>b) overloading and moment limiting devices,</p> <p>c) devices to prevent collisions or interference with other machines,</p> <p>d) devices for preventing hazards to pedestrian operators of mobile machinery or other pedestrians,</p> <p>e) torque limiting devices, and breakage points to prevent excessive stress of components and assemblies,</p> <p>f) devices for limiting pressure or temperature,</p> <p>g) devices for monitoring emissions,</p> <p>h) devices to prevent operation in the absence of the operator at the control position,</p> <p>i) devices to prevent lifting operations unless stabilizers are in place,</p> <p>j) devices to limit inclination of the machine on a slope, and</p> <p>k) devices to ensure that components are in a safe position before travelling.</p>	Not applicable.	N/A
	Automatic protective measures triggered by such devices that take operation of the machinery out of the control of the operator (for example, automatic stop of hazardous movement) should be preceded or accompanied by a warning signal to enable the operator to take appropriate action (see 6.4.3).	Not applicable.	N/A
6.3.3	Requirements for design of guards and protective devices		
6.3.3.1	General requirements		
	Guards and protective devices shall be designed to be suitable for the intended use, taking into account mechanical and other hazards involved. Guards and protective devices shall be compatible with the working environment of the machine and designed so that they cannot be easily defeated. They shall provide the minimum possible interference	Guards and protective devices have been appropriately designed.	Pass

	with activities during operation and other phases of machine life, in order to reduce any incentive to defeat them.		
	Guards and protective devices shall		
	a) be of robust construction,	This requirement has been taken into account during design.	Pass
	b) not give rise to any additional hazard,	This requirement has been taken into account during design.	Pass
	c) not be easy to bypass or render non-operational,	This requirement has been taken into account during design.	Pass
	d) be located at an adequate distance from the danger zone (see ISO 13855 and ISO 13857),	This requirement has been taken into account during design.	Pass
	e) cause minimum obstruction to the view of the production process,	This requirement has been taken into account during design.	Pass
	f) enable essential work to be carried out for the installation and/or replacement of tools and for maintenance by allowing access only to the area where the work has to be carried out — if possible, without the guard having to be removed or protective device having to be disabled.	This requirement has been taken into account during design.	Pass
6.3.3.2	Requirements for guards		
6.3.3.2.1	Functions of guards		
	The functions that guards can achieve are		
	- prevention of access to the space enclosed by the guard, and/or - containment/capture of materials, workpieces, chips, liquids which can be ejected or dropped by the machine, and	These functions are achieved by fixed guards	Pass

	reduction of emissions (noise, radiation, hazardous substances such as dust, fumes, gases) that can be generated by the machine.		
	Additionally, they could need to have particular properties relating to electricity, temperature, fire, explosion, vibration, visibility (see ISO 14120) and operator position ergonomics (for example, usability, operator's movements, postures, repetitive movements).	These functions are achieved by fixed guards	Pass
6.3.3.2.2	Requirements for fixed guards		
	Fixed guards shall be securely held in place either - permanently (for example 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.	Pass
6.3.3.2.3	Requirements for movable guards		
	Movable guards which provide protection against hazards generated by moving transmission parts shall a) as far as possible when open remain fixed to the machinery or other structure (generally by means of hinges or guides), and b) be interlocking (with guard locking when necessary) (see ISO 14119). See Figure 4. 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, with this able to be achieved by interlocking guards, with guard locking when necessary, - they can be adjusted only by an intentional action, such as the use of a tool or a key, and - the absence or failure of one of their	Not applicable.	N/A

	components either prevents starting of the moving parts or stops them, with this able to be achieved by automatic monitoring (see 6.2.11.6).		
6.3.3.2.4	Requirements for adjustable guards		
	Adjustable guards may only be used where the hazard zone cannot for operational reasons be completely enclosed. Manually adjustable guards shall be - designed so that the adjustment remains fixed during a given operation, and - readily adjustable without the use of tools.	Not applicable.	N/A
6.3.3.2.5	Requirements for interlocking guards with a start function (control guards)		
	An interlocking guard with a start function may only be used provided that a) all requirements for interlocking guards are satisfied (see ISO 14119), b) the cycle time of the machine is short, c) the maximum opening time of the guard is preset to a low value (for example, equal to the cycle time) and, when this time is exceeded, the hazardous function(s) cannot be initiated by the closing of the interlocking guard with a start function and resetting is necessary before restarting the machine, d) the dimensions or shape of the machine do not allow a person, or part of a person, to stay in the hazard zone or between the hazard zone and the guard while the guard is closed (see ISO 14120), e) all other guards, whether fixed (removable type) or movable, are interlocking guards, f) the interlocking device associated with the interlocking guard with a start function is designed such that — for example, by duplication of position detectors and use of automatic monitoring (see 6.2.11.6) — its failure cannot lead to an unintended/unexpected start-up, and	Not applicable.	N/A

	g) the guard is securely held open (for example, by a spring or counterweight) such that it cannot initiate a start while falling by its own weight.		
6.3.3.2.6	Hazards from guards		
	Care shall be taken to prevent hazards which could be generated by <ul style="list-style-type: none"> - the guard construction (sharp edges or corners, material, noise emission, etc.), - the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall). 	No such hazards exist in this machine.	Pass
6.3.3.3	Technical characteristics of protective devices		
	Protective devices shall be selected or designed and connected to the control system such that correct implementation of their safety function(s) is ensured.	This requirement has been taken into account during design.	Pass
	Protective devices shall be selected on the basis of their having met the appropriate product standard (for example, IEC 61496 for active optoelectronic protective devices) or shall be designed according to one or several of the principles formulated in ISO 13849-1 or IEC 62061.	This requirement has been taken into account during design.	Pass
	Protective devices shall be installed and connected to the control system so that they cannot be easily defeated.	This requirement has been taken into account during design.	Pass
6.3.3.4	Provisions for alternative types of safeguards		
	Provisions should be made to facilitate the fitting of alternative types of safeguards on machinery where it is known that it will be necessary to change the safeguards because of the range of work to be carried out.	Not applicable.	N/A
6.3.4	Safeguarding to reduce emissions		
6.3.4.1	General		
	If the measures for the reduction of emissions		Pass

	at source specified in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).		
6.3.4.2	Noise		
	Additional protective measures against noise include - enclosures (see ISO 15667), - screens fitted to the machine, and - silencers (see ISO 14163).	No such hazards exist in this machine.	Pass
6.3.4.3	Vibration		
	Additional protective measures against vibration include - vibration isolators, such as damping devices placed between the source and the exposed person, - resilient mounting, and - suspended seats. For measures for vibration isolation of stationary industrial machinery see EN 1299.	No such hazards exist in this machine.	Pass
6.3.4.4	Hazardous substances		
	Additional protective measures against hazardous substances include - encapsulation of the machine (enclosure with negative pressure), - local exhaust ventilation with filtration, - wetting with liquids, and <input type="checkbox"/> special ventilation in the area of the machine (air curtains, cabins for operators).	No such hazards exist in this machine.	Pass
6.3.4.5	Radiation		
	Additional protective measures against radiation include - use of filtering and absorption, and - use of attenuating screens or guards.	No such hazards exist in this machine.	Pass
6.3.5	Complementary protective measures		
6.3.5.1	General		
	Protective measures which are neither inherently safe design measures, nor safeguarding (implementation of guards and/or		Pass

	protective devices), nor information for use, could have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine. Such measures include, but are not limited to, those dealt with in 6.3.5.2 to 6.3.5.6.		
6.3.5.2	Components and elements to achieve emergency stop function		
	If, following a risk assessment, a machine needs to be fitted with components and elements to achieve an emergency stop function for enabling actual or impending emergency situations to be averted, the following requirements apply:		
	- the actuators shall be clearly identifiable, clearly visible and readily accessible;	The actuators can be clearly identifiable, clearly visible and readily accessible	Pass
	- the hazardous process shall be stopped as quickly as possible without creating additional hazards, but if this is not possible or the risk cannot be reduced, it should be questioned whether implementation of an emergency stop function is the best solution;	The hazardous process can be stopped as quickly as possible without creating additional hazards	Pass
	- the emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.	No this situation exists.	Pass
	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.	Reset is necessary before re-start.	Pass
	This reset shall be possible only at the location where the emergency stop command has been initiated. The reset of the device shall not restart the machinery, but shall only permit restarting.	This requirement is complied with by appropriate design of the emergency stop.	
	More details for the design and selection of electrical components and elements to achieve	Please see the related clauses.	Pass

	the emergency stop function are provided in IEC 60204.		
6.3.5.3	Measures for the escape and rescue of trapped persons		
	Measures for the escape and rescue of trapped persons may consist, among others, of <ul style="list-style-type: none"> - escape routes and shelters in installations generating operator-trapping hazards, - arrangements for moving some elements by hand, after an emergency stop, - arrangements for reversing the movement of some elements, - anchorage points for descender devices, - means of communication to enable trapped operators to call for help. 	Not applicable.	N/A
6.3.5.4	Measures for isolation and energy dissipation		
	Machines shall be equipped with the technical means to achieve isolation from power supply(ies) and dissipation of stored energy by means of the following actions:		
	a) isolating (disconnecting, separating) the machine (or defined parts of the machine) from all power supplies;	A main switch with lock is provided	Pass
	b) locking (or otherwise securing) all the isolating units in the isolating position;	Please see the report for EN60204	Pass
	c) dissipating or, if this is not possible or practicable, restraining (containing) any stored energy which can give rise to a hazard;	Please see the report for EN60204	Pass
	d) verifying, by means of safe working procedures, that the actions taken according to a), b) and c) above have produced the desired effect.	Please see the report for EN60204	Pass
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts		
	Machines and their component parts which cannot be moved or transported by hand shall be provided or be capable of being provided with suitable attachment devices for transport by means of lifting gear.	Appropriate attachments are provided.	Pass

	These attachments may be, among others,		
	- standardized lifting appliances with slings, hooks, eyebolts, or tapped holes for appliance fixing,	Such devices are used	Pass
	- appliances for automatic grabbing with a lifting hook when attachment is not possible from the ground,		N/A
	- fork locating devices for machines to be transported by a lift truck,	Such devices are used	Pass
	- lifting and stowing gear and appliances integrated into the machine.		N/A
	Parts of machinery which can be removed manually in operation shall be provided with means for their safe removal and replacement.		Pass
6.3.5.6	Measures for safe access to machinery		
	Machinery shall be so designed as to enable operation and all routine tasks relating to setting and/or maintenance to be carried out as far as possible by a person remaining at ground level.		Pass
	<p>Where this is not possible, machines shall have built-in platforms, stairs or other facilities to provide safe access for those tasks; however, care should be taken to ensure that such platforms or stairs do not give access to danger zones of machinery.</p> <p>The walking areas shall be made from materials which remain as slip resistant as practicable under working conditions and, depending on the height from the ground, shall be provided with suitable guard-rails (see ISO 14122-3).</p> <p>In large automated installations, particular attention shall be given to safe means of access, such as walkways, conveyor bridges or crossover points.</p> <p>Means of access to parts of machinery located at height shall be provided with collective means of protection against falls (for example, guard-rails for stairways, stepladders and</p>	Not applicable.	N/A

	<p>platforms and/or safety cages for ladders).</p> <p>As necessary, anchorage points for personal protective equipment against falls from height shall also be provided (for example, in carriers of machinery for lifting persons or with elevating control stations).</p> <p>Openings shall, whenever possible, open towards a safe position. They shall be designed to prevent hazards due to unintended opening.</p> <p>The necessary aids for access shall be provided (steps, handholds, etc.). Control devices shall be designed and located to prevent their being used as aids for access.</p> <p>When machinery for lifting goods and/or persons includes landings at fixed levels, these shall be equipped with interlocking guards for preventing falls when the platform is not present at a level. Movement of the lifting platform shall be prevented while the guards are open.</p>		
6.4	Information for use		
6.4.1	General requirements		
6.4.1.1	<p>Drafting information for use is an integral part of the design of a machine (see Figure 2). Information for use consists of communication links, such as texts, words, signs, signals, symbols or diagrams, used separately or in combination to convey information to the user. Information for use is intended for professional and/or non-professional users.</p>	All the information is stated in the appropriate place.	Pass
6.4.1.2	Information shall be provided to the user about the intended use of the machine, taking into account, notably, all its operating modes.		
	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.	All the information is stated in the instruction manual.	Pass
	The information shall indicate, as appropriate,		
	- the need for training,	All the information is	Pass

	<ul style="list-style-type: none"> - the need for personal protective equipment, and - the possible need for additional guards or protective devices (see Figure 2, Footnote d). 	stated in the instruction manual.	
	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.	All the information is stated in the appropriate place.	Pass
6.4.1.3	Information for use shall cover, separately or in combination, transport, assembly and installation, commissioning, use of the machine (setting, teaching/programming or process changeover, operation, cleaning, fault-finding and maintenance) and, if necessary, dismantling, disabling and scrapping.	All the information is stated in the instruction manual.	Pass
6.4.2	Location and nature of information for use		
	Depending on the risk, the time when the information is needed by the user and the machine design, it shall be decided whether the information — or parts thereof — are to be given		Pass
	a) in/on the machine itself (see 6.4.3 and 6.4.4),	Adequate information is stated in the instruction manual.	Pass
	b) in accompanying documents (in particular instruction handbook, see 6.4.5),	Adequate information is stated in the instruction manual.	Pass
	c) on the packaging,	Adequate information is stated in the instruction manual.	Pass
	d) by other means such as signals and warnings outside the machine.	Adequate information is stated in the instruction manual.	Pass
	Standardized phrases shall be considered where important messages such as warnings		Pass

	are given (see also IEC 62079).		
6.4.3	Signals and warning devices		
	Visual signals, such as flashing lights and audible signals such as sirens may be used to warn of an impending hazardous event such as machine start-up or overspeed. Such signals may also be used to warn the operator before the triggering of automatic protective measures (see 6.3.2.7).	Signals and warning devices are provided.	Pass
	It is essential that these signals		
	a) be emitted before the occurrence of the hazardous event, b) be unambiguous, c) be clearly perceived and differentiated from all other signals used, and d) be clearly recognized by the operator and other persons.	This requirement is taken into account during design and selection of the warning devices.	Pass
	The warning devices shall be designed and located such that checking is easy. The information for use shall prescribe regular checking of warning devices.		Pass
	The attention of designers is drawn to the possibility of “sensorial saturation”, which can result from too many visual and/or acoustic signals and which can also lead to defeating the warning devices.		Pass
6.4.4	Markings, signs (pictograms) and written warnings		
	Machinery shall bear all markings which are necessary		
	a) for its unambiguous identification, including at least		
	1) the name and address of the manufacturer, 2) the designation of series or type, and 3) the serial number, if any,	Adequate information is provided.	Pass
	b) in order to indicate its compliance with mandatory requirements, comprising		
	1) marking, and 2) written indications, such as the authorized	Adequate information is provided.	Pass

	representative of the manufacturer, designation of the machinery, year of construction, and intended use in potentially explosive atmospheres),		
	c) for its safe use, for example,		
	1) maximum speed of rotating parts, 2) maximum diameter of tools, 3) mass (in kilograms) of the machine itself and/or of removable parts, 4) maximum working load, 5) necessity of wearing personal protective equipment, 6) guard adjustment data, and 7) frequency of inspection.	Adequate information is provided.	Pass
	Information printed directly on the machine should be permanent and remain legible throughout the expected life of the machine.	This requirement is complied with.	Pass
	Signs or written warnings indicating only "Danger" shall not be used.	This requirement is complied with.	Pass
	Markings, signs and written warnings shall be readily understandable and unambiguous, especially as regards the part of the function(s) of the machine to which they are related. Readily understandable signs (pictograms) should be used in preference to written warnings.	This requirement is complied with.	Pass
	Signs and pictograms should only be used if they are understood in the culture in which the machinery is to be used.	This requirement is complied with.	Pass
	Markings shall comply with recognized standards (for example, ISO 2972 or ISO 7000, for pictograms, symbols and colours in particular).	All the markings are standard.	Pass
6.4.5	Accompanying documents (in particular — instruction handbook)		
6.4.5.1	Contents		
	The instruction handbook or other written instructions (for example, on the packaging) shall contain, among others, the following:	All the related information is stated in the instruction	Pass

		handbook	
	a) information relating to transport, handling and storage of the machine, such as		
	1) storage conditions for the machine, 2) dimensions, mass value(s), position of the centre(s) of gravity, and 3) indications for handling (for example, drawings indicating application points for lifting equipment);	All the related information is stated in the instruction handbook	Pass
	b) information relating to installation and commissioning of the machine, such as		
	1) fixing/anchoring and dampening of noise and vibration requirements, 2) assembly and mounting conditions, 3) space needed for use and maintenance, 4) permissible environmental conditions (for example, temperature, moisture, vibration, electromagnetic radiation), 5) instructions for connecting the machine to power supply (particularly on protection against electrical overloading), 6) advice on waste removal/disposal, and 7) if necessary, recommendations related to protective measures which have to be implemented by the user — for example, additional safeguards (see Figure 2, Footnote d), safety distances, safety signs and signals;	All the related information is stated in the instruction handbook	Pass
	c) information relating to the machine itself, such as		
	1) detailed description of the machine, its fittings, guards and/or protective devices, 2) the comprehensive range of applications for which the machine is intended, including prohibited usages, if any, taking into account variations of the original machine if appropriate, 3) diagrams (especially schematic representation of safety functions),	All the related information is stated in the instruction handbook	Pass

	<p>4) data on noise and vibration generated by the machine, and on radiation, gases, vapours and dust emitted by it, with reference to the measuring methods (including measurement uncertainties) used,</p> <p>5) technical documentation of electrical equipment (see IEC 60204), and</p> <p>6) documents attesting that the machine complies with mandatory requirements;</p>		
	d) information relating to the use of the machine, such as that related to or describing		
	<p>1) intended use,</p> <p>2) manual controls (actuators),</p> <p>3) setting and adjustment,</p> <p>4) modes and means for stopping (especially emergency stop),</p> <p>5) risks which could not be eliminated by the protective measures implemented by the designer,</p> <p>6) particular risks which can be generated by certain applications, by the use of certain fittings, and</p> <p>about specific safeguards necessary for such applications,</p> <p>7) reasonably foreseeable misuse and prohibited applications,</p> <p>8) fault identification and location, for repair and for restarting after an intervention, and</p> <p>9) personal protective equipment needed to be used and the training that is required;</p>	All the related information is stated in the instruction handbook	Pass
	e) information for maintenance, such as		
	<p>1) the nature and frequency of inspections for safety functions,</p> <p>2) specification of the spare parts to be used when these can affect the health and safety of operators,</p> <p>3) instructions relating to maintenance operations which require a definite technical knowledge or particular skills and hence need to be carried out exclusively by skilled persons</p>	All the related information is stated in the instruction handbook	Pass

	(for example, maintenance staff, specialists), 4) instructions relating to maintenance actions (replacement of parts, etc.) which do not require specific skills and hence may be carried out by users (for example, operators), and 5) drawings and diagrams enabling maintenance personnel to carry out their task rationally (especially fault-finding tasks);		
	f) information relating to dismantling, disabling and scrapping;	All the related information is stated in the instruction handbook	Pass
	g) information for emergency situations, such as		
	1) the operating method to be followed in the event of accident or breakdown, 2) the type of fire-fighting equipment to be used, and 3) a warning of possible emission or leakage of hazardous substance(s) and, if possible, an indication of means for fighting their effects;	All the related information is stated in the instruction handbook	Pass
	h) maintenance instructions provided for skilled persons [item e) 3) above] and maintenance instructions provided for unskilled persons [item e) 4) above], that need to appear clearly separated from each other.	All the related information is stated in the instruction handbook	Pass
6.4.5.2	Production of instruction handbook		
	The following applies to the production and presentation of the instruction handbook.		
	a) The type font and size of print shall ensure the best possible legibility. Safety warnings and/or cautions should be emphasized by the use of colours, symbols and/or large print.	All the related information is stated in the instruction handbook	Pass
	b) The information for use shall be given in the language(s) of the country in which the machine will be used for the first time and in the original version.		Pass

	If more than one language is to be used, each should be readily distinguished from another, and efforts should be made to keep the translated text and relevant illustration together..		Pass
	NOTE In some countries the use of specific language(s) is covered by legal requirements		
	c) Whenever helpful to the understanding, text should be supported by illustrations. These illustrations should be supplemented with written details enabling, for example, manual controls (actuators) to be located and identified. They should not be separated from the accompanying text and should follow sequential operations.		Pass
	d) Consideration should be given to presenting information in tabular form where this will aid understanding. Tables should be adjacent to the relevant text.		Pass
	e) The use of colours should be considered, particularly in relation to components requiring quick identification.		Pass
	f) When information for use is lengthy, a table of contents and/or an index should be provided.		Pass
	g) Safety-relevant instructions which involve immediate action should be provided in a form readily available to the operator.		Pass
6.4.5.3	Drafting and editing information for use		
	The following applies to the drafting and editing of information for use.		Pass
	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).	All the related information is stated in the instruction handbook	Pass
	b) Communication principles: when information for use is being prepared, the communication process “see – think – use” should be followed in order to achieve the maximum effect and should follow sequential		Pass

	operations. The questions, “How?” and “Why?” should be anticipated and the answers provided.		
	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.		Pass
	d) When it is foreseen that a machine will be put to non-professional use, the instructions should be written in a form that is readily understood by the non-professional user. If personal protective equipment is required for the safe use of the machine, clear advice should be given, for example, on the packaging as well as on the machine, so that this information is prominently displayed at the point of sale.		Pass
	e) Durability and availability of the documents: documents giving instructions for use should be produced in durable form (i.e. they should be able to survive frequent handling by the user). It can be useful to mark them “keep for future reference”. Where information for use is kept in electronic form (CD, DVD, tape, hard disk, etc.), information on safety-related issues that need immediate action shall always be backed up with a hard copy that is readily available.		Pass
7	Documentation of risk assessment and risk reduction		Pass
	The documentation shall demonstrate the procedure that has been followed and the results that have been achieved. This includes, when relevant, documentation of		Pass
	a) the machinery for which the risk assessment has been made (for example, specifications, limits, intended use);	Please see the risk assessment report in detail.	Pass
	b) any relevant assumptions that have been made (loads, strengths, safety factors, etc.);		Pass
	c) the hazards and hazardous situations		Pass

	identified and the hazardous events considered in the risk assessment;		
	d) the information on which risk assessment was based (see 5.2):		Pass
	1) the data used and the sources (accident histories, experience gained from risk reduction applied to similar machinery, etc.);		Pass
	2) the uncertainty associated with the data used and its impact on the risk assessment;		Pass
	e) the risk reduction objectives to be achieved by protective measures;		Pass
	f) the protective measures implemented to eliminate identified hazards or to reduce risk;		Pass
	g) residual risks associated with the machinery;		Pass
	h) the result of the risk assessment (see Figure 1);		Pass
	i) any forms completed during the risk assessment.		Pass
	Standards or other specifications used to select protective measures referred to in f) above should be referenced.		Pass

3. Airborne noise test report

I. Applicable standards

1. EN ISO 3744:2010 Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane.
2. EN ISO 11202: Acoustics-Noise emitted by machinery and equipment-Measurement of emission sound pressure levels at the work station and at other specified positions-Survey method in situ.
3. ISO/TR 11688-1: Acoustics-Recommended practice for the design of low-noise machinery and equipment -Part 1 : Planning.

II. Test instrument

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

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

III. Measurement method

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

For operator positions in process of measurement, the measuring instrument is to be set at a distance of 1 m from the machine and 1.5 m above the floor.

IV. Test environment

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

V. Test result

1. Background

Reading value : 66dB(A)

2. Sound pressure level (machine on "Stand by" and normal load condition)

Position	1	2	3	4	5
Reading (dB (A))	69.2	68.3	69.3	69.3	68.2

3. Sound pressure level (machine on full load condition)

Position	1	2	3	4	5
Reading (dB (A))	69.5	68.8	68.4	69.6	68.6

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

$$L_w = L_{pf} + 10 \times \log (S/S_0)$$

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

- End of Airborne Noise Test Report -

EN 1010-1:2004+A1:2010 TEST REPORT

MANUFACTURER:	Zhejiang Baolong Machinery Company Limited	
ADD:	No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
EUT:	Automatic Die-cutting Machine	
Model:	See Below.	
According to Directive	Machinery Directive: 2006/42/EC	
According to standards	EN 1010-1:2004+A1:2010	
Method	<ul style="list-style-type: none">- Witness examination- Inspection of documentation- Test- Measurement	
Test location	Zhejiang Baolong Machinery Company Limited	
Date	2024/01/03	
Test performed by	Joe Ji	<i>Joe Ji</i>
	Inspection Engineer	
Reviewed by	Scotty Wan	<i>Scotty</i>
	Product Manager	

Model:

BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050EHT, BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH, BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS

Article	Sub-article	Requirement	Fulfilment			Remark
			Y	N	N/A	
1		Scope				
2		Normative references				
3		Terms and definitions				
4		List of significant hazards				
5		Safety requirements and/or protective measures				See following clauses for details
	5.1	General				Safety requirements are considered
	5.2	Requirments common to printing and paper converting machines				See following clauses for details
	5.2.1	Safeguarding of danger points				See following clauses for details
	5.2.1.1	Inrunning nips on cylinders, rollers, drums, rolls and similar parts shall be safeguarded by guards or by applying the safety distances specified in EN 349:1993. On guide rollers, the safety distance specified for the arm is considered to be sufficient where risk assessment has determined that whole-body or head access cannot be expected. Guards shall be designed as follows: a) as guards without openings or with openings for feeding the material (for example sheets, blanks, webs, work pieces). The safety distances shall be established in relation to the width of the opening in accordance with EN 294:1992 (see Figure 2). These guards shall be interlocked with the dangerous movements in accordance with 5.2.2 or they shall be fixed to the machine. When the interlocking guard is open, one of the measures set out in 5.2.3 shall become effective. b) on smooth-surface rollers or cylinders as fixed nip bars extending across the entire working width, designed in suitable sections. The clearance between the bar and the respective machine part, for example, cylinders, rollers with a smooth surface etc., shall not exceed 6 mm (see Figure 3).				Guards are provided Safety distance is considered during design
	5.2.1.2	The use of trip devices for safeguarding inrunning nips shall be permitted only if the condition defined in 5.2.10.2 is satisfied.				No this kind of guard
	5.2.1.3	Linear movements are considered to be sufficiently safe if the maximum distance between moving part and fixed part does not exceed 4 mm.				≤4mm

	5.2.1.4	On machines which travel under power, the crushing points between wheels and floor shall be safeguarded. Safeguarding of crushing points is achieved, for example, by providing foot guards fixed such that there is a distance of no more than 15 mm between the runway and the lower edge				≤15mm
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		of the guard.				
	5.2.1.5	Handwheels and cranks shall be so designed that they do not automatically rotate when the machine operates at production speed. This is achieved, for example, where handwheels and cranks are decoupled by pressure springs during the production run.				No handwheel
	5.2.1.6	Where machines with movable parts are used in the workroom, the instruction handbook shall require users to erect machines in such a way that the hazard of crushing of persons between movable machine parts and the building is prevented.				
	5.2.2	Guards and interlocks				See below
	5.2.2.1	Guards shall satisfy the requirements of EN 953:1997. Interlocking shall satisfy the requirements of clauses 5 and 6 of EN 1088:1995. Stopping times vary with the type of machine used, but should be as short as possible. For interlocking, see 5.2.11 (safety position switches with approach reaction) and 5.2.6 (control systems).				Fixed guards and interlocking guards are installed
	5.2.2.2	For fence-type enclosures, the safety distances according to EN 294:1992 apply. A further requirement is that the distance between the floor and lower edge of the fence does not exceed 200 mm and between the floor and upper edge is at least 1,4 m.				
	5.2.2.3	Guards and access doors in enclosures which are opened or removed frequently in the production process or for setting-up operations shall be interlocked with the hazardous movements. Guards which do not have to be opened frequently shall be fixed in such a way that their removal necessitates the use of tools. These guards may also be interlocked with the hazardous movements. When fixed guards are used and it is foreseeable that they will be removed e.g. for maintenance, adjustment, setting, their fastenings shall remain attached to the guard or to the machinery when the guard is removed (see Figure 5).				Interlocking guards which are used frequently are installed to protect the hazardous movement Fixed guards are designed as the fastening remains attached to guard which is removed from machinery
	5.2.2.4	Automatic travel of movable guards shall not create danger points. EN 953:1997 shall be complied with.				
	5.2.2.5	Guards that can be opened shall be safeguarded against gravity falls if this creates a risk of injury. Measures to prevent such gravity falls include, for example, devices for balancing the weight; pneumatic springs; latches which automatically hold the parts open; power-driven worm gear drives actuated by hold-to-run;				

		<p>by ensuring that the centre of gravity of the guard in the open position is sufficiently far behind the axis of rotation.</p> <p>Springs used for balancing the weight shall be designed such that, in the event of a spring failure, no dangerous closing movement may occur. Compression-type springs are to be preferred.</p>				
	5.2.2.6	<p>Where production processes need to be observed, guards shall ensure permanent sufficient vision of the functional point without being impaired by reflections. This requirement is satisfied, for example, by mesh-type guards painted in matt black.</p>				
	5.2.3	<p>Devices for setting-up, cleaning, troubleshooting during the work process and maintenance</p>				
	5.2.3.1	<p>Where accessible danger zones cannot be observed from positions from which hazardous movements can be started, one of the following requirements shall be satisfied:</p> <p>where accessible danger zones are safeguarded by a fence-type enclosure, it shall not be possible for the person(s) within the enclosure to close the interlocking access gate or an additional control device shall be provided outside the enclosure in such a position that it cannot be actuated from the inside. Any hazardous movement shall be permitted only after the access door has been closed and the control device been actuated;</p> <p>where accessible danger zones are safeguarded by means of ESPDs, an additional control element shall be provided outside the danger zone that cannot be reached from any position in the danger zone.</p> <p>Provisions shall be made that the hazardous movement can only be started after the person has actuated the additional control element.</p>				<p>Interlocking guards are used to protect hazardous movements, when open the interlocking guard, the machine can't be started.</p>
	5.2.3.2	<p>When the interlocking guard is opened or removed or if a person has entered the danger zone to carry out adjustments or process correction and there are danger points unprotected, it shall only be possible to start a machine by means of:</p> <p>a) Hold-to-run control devices combined with:</p> <p>1) a displacement limited to a maximum of 25 mm for each operation of the control device or with a maximum operating speed of 1 m/min, or</p> <p>2) displacement limited to a maximum of 75 mm or with a maximum operating speed of 5 m/min where there would be no substantially increased hazard and where the measures defined in 1) above would reduce the ability of the machine to perform its function.</p> <p>For hold-to-run devices designed as two-hand controls, the same limitations of displacement and speed shall apply.</p>				

		<p>Any two-hand control device shall satisfy the requirements defined in 5.2.8. The stopping distance shall be as short as technically feasible. The machine shall stop before the hazard can be reached.</p> <p>Starting the machine in the hold-to-run mode after opening an interlocking guard may be done without operating a selector switch, if production operation during hold-to-run control is positively prevented by the interlocking device.</p> <p>b) Manual operation</p> <p>Devices which allow manual operation of the machine or parts of the machine shall be designed so that persons are not exposed to danger.</p>				
	5.2.3.3	From the place of operation of the hold-to-run control, it shall be possible to observe the danger points and danger zones.				
	5.2.3.4	Where hold-to-run controls are being used for safeguarding a danger point, starting the machine in the hold-to-run mode after opening the interlocking guard shall only be possible when other interlocking guards outside the area that can be observed by the operator are closed.				
	5.2.3.5	<p>Safe threading of the web-type material shall be ensured. On power-driven web threading devices, access to danger points shall be prevented by guards.</p> <p>Access to danger points is considered prevented if, for example:</p> <ul style="list-style-type: none"> on rope-type threading devices, the inrunning nips between threading rope and idler pulley are safeguarded. Safeguarding may include the provision, on the outside of the pulleys, of a fixed disc, the radius of which is at least 120 mm larger than that of the pulley, on power-driven bar-type threading devices with transport chains, the inrunning nips between chains and chain wheels are provided with guards filling the inrunning nips as far as possible, threading is carried out under hold-to-run control with speed limitation. 				
	5.2.4	Explosion prevention and protection				No this kind of hazardous
	5.2.5	Electrical equipment				See below
	5.2.5.1	All electrical equipment shall be designed such that electrical hazards (for example electric shock, burns) according to EN 60204-1:2006 are prevented. The requirements of EN 60204-1:2006 shall be fulfilled, taking into account the following additional requirements.				Electrical equipment is designed according to EN 60204-1, see EN 60204-1 checklist for details
	5.2.5.2	Machines shall be provided with a supply disconnecting device in accordance with 5.3.2 a) or c) of EN 60204-1:2006. The device shall be provided with a means to be locked in the OFF position. Where the operation of the emergency stop control devices causes galvanic				

		<p>disconnection from the power supply by undervoltage tripping, a circuit-breaker in accordance with 5.3.2 c) of EN 60204-1:2006 is required.</p> <p>Where circuits as specified in 5.3.5 of EN 60204-1:2006 are not disconnected by the supply disconnecting device, such circuits shall be provided with their own disconnecting device. See also 5.2.7.5.</p>				
	5.2.5.3	<p>Emergency stop devices shall be designed in accordance with 9.2.5.4.2 of EN 60204-1:2006 either as a category 0 stop or as a category 1 stop. On machines where inrunning nips are safeguarded by trip bars according to 5.2.10, the emergency stop shall function as a category 1 stop. See also 5.2.6.1.2.</p>				
	5.2.5.4	<p>On rectifier drives, the actuation of an emergency stop control device may, as a deviation from EN 60204-1:2006, 9.2.5.4, cause stopping of the drive as a category 2 stop according to EN 60204-1:2006, 9.2.2 if:</p> <ul style="list-style-type: none"> pulse blocking in the rectifier and disconnecting the voltage supply to encoder and associated control circuitry <p>!are separate functions in accordance with PLr"d" of EN ISO 13849-1:2008 or SIL 2 of EN 62061:2005.</p>				
	5.2.5.5	<p>Where, for operational reasons, a category 2 stop according to EN 60204-1:2006, 9.2.2 (i.e. a stop control that does not cut off the energy supply to the actuators) is required, the stop condition shall be monitored and maintained."</p>				
	5.2.5.6	<p>Electrical devices and conductors shall be installed in such a way that damage from mechanical stresses and environmental influences are prevented. Electrical devices should be to IP 54 according to EN 60529:1991.</p>				IP 54 Electrical cabinet can be considered as an enclosure
	5.2.5.7	<p>For insulated single-core conductors laid between two terminals inside an enclosure (for example, a switch cabinet), one of the following methods shall be used for conductor identification:</p> <ul style="list-style-type: none"> identification by number or alphanumerically; identification by colour in accordance with EN 60204-1:2006, 13.2.4; securing conductors in position, for example by using comb-type wire fixing in such a way that any confusion of conductors when changing electric components is safely prevented; or another adequate method. 				Conductors are labelled by number and color
	5.2.5.8	<p>All electrical equipment shall be designed such that it will withstand the testing specified in EN 60204-1:2006, 18.2 to 18.6. Voltage tests as specified in EN 60204-1:2006, 18.4 are not required for electronic control circuits provided by computer systems or electronic control components.</p>				Relevant tests are done, see LVD test report for details

5.2.5.9		Measuring devices which are part of machines shall comply with EN61010-1:2001.				
5.2.6		Control systems				See below
5.2.6.1		If in automatic mode, the starting of the machinery or restarting after a stoppage, or a change in operating conditions occurs without intervention by the operator the hazardous area shall be safeguarded to prevent starting when a person is in the hazardous area and access when the machinery is running.				
5.2.6.2		A fault in the hardware or the software of the control system shall not lead to hazardous situations.				
5.2.6.3		Control requirements for pre-press machinery, printing presses, automatically fed machines and machines which are not listed under 5.2.6.4.				
5.2.6.3.1		<p>For hydraulic/pneumatic control systems, the safety related parts shall at least comply with PL "c" in accordance with EN ISO 13849-1:2008. If there is a risk of irreversible head or torso injuries then the safety related parts shall at least comply with PL "d" in accordance with EN ISO 13849-1:2008.</p> <p>For an electric/electronic control system, the safety related parts shall satisfy, in relation to the extent of foreseeable harm, the requirements of EN ISO 13849-1:2008 (performance level PLr) or EN 62061:2005 (safety integrity level SIL) according to the following:</p> <p style="padding-left: 40px;">PLr "d" or SIL 2</p> <p>This level of safety shall apply to functions and control systems which can cause normally irreversible injuries or a risk of head or torso injuries. These functions are established in Table 2.</p> <p style="padding-left: 40px;">PLr "c" or SIL 1</p> <p>This level of safety shall apply for functions and control systems if there are no irreversible injuries or a risk of head or torso injuries. These functions are established in Table 2.</p> <p>At least the following control systems shall satisfy Table 2 which shows the relevant applications. Others are specified in the other parts of EN 1010.</p> <p>The minimum requirement is that faults in the auxiliary relays and auxiliary contactors in the control circuit shall be detected and hazardous movements stopped. When using a programmable electronic system or Programmable Logic Controller (PLC) as a part of a safety related control system, safety-related malfunctions shall be detected and the hazardous movements shall be stopped.</p> <p>When using parallel programmable electronic systems or PLCs for monitoring the function of safety-related signals, the detection of malfunctions shall result in the hazardous</p>				

		<p>movement being stopped.</p> <p>Safety-related parts of emergency stop circuits, electric interlocking circuits, limitation of displacement or operating speed with hold-to-run controls shall satisfy EN ISO 13849-1:2008 or EN 62061:2005.</p>				
	5.2.6.3.2	<p>On rectifier and inverter drives, the control system shall be designed such that, in the event of a control signal through the activation of a safety device causing the machine to stop, the main contactor will be switched off after a preset time using an electric/electronic timer or by a measure such as the application of a mechanical brake with a braking torque greater than the drive torque of the motor. Relevant safety devices are emergency stop devices, ESPDs, interlocked guards and trip devices.</p> <p>On rectifier and inverter drives which feed energy back into the electric circuit during relevant stopping functions, in addition to pulse blocking, the main contactor shall be switched off no later than the elapse of the normal stopping time. Relevant stopping functions result from the activation of emergency stop, interlocked guards, trip devices, ESPDs, end of production and end of crawl speed.</p>				<p>After active a safety device, main contactor will be switched off in short time</p>
	5.2.6.3.3	<p>When an emergency stop device is used with a main contactor which detects a low voltage condition, the system for disconnecting the main power supply shall at least comply with PL "c" in accordance with EN ISO 13849-1:2008 or SIL 1 of EN 62061:2005.</p>				
	5.2.6.3.4	<p>When for adjustment or setting with guards open or other protective devices disabled, machine movement at reduced speed or limited movement is necessary by means of e.g. a hold-to-run control device or a two-hand-control, such movement shall be restricted to machinery within the view of the person operating the hold-to-run control device or the two-hand control. The interlocking/safety related parts of the control system providing this function shall comply at least with PL "b", in accordance with EN ISO 13849-1:2008, or SIL 1 of EN 62061:2005.</p>				<p>When open the interlocking guard, the machine can't be started</p> <p>Only aothored person can enter the danger zone using password</p>
	5.2.6.3.5	<p>Residual pile monitoring systems shall at least comply with PL "b" in accordance with EN ISO 13849-1:2008 or SIL 1 of EN 62061:2005.</p>				
	5.2.6.4 5.2.6.4.1	<p>Increased control system requirements for hand-fed machines</p> <p>In the hydraulic/pneumatic control system, the safety related parts shall at least comply with PL "d" in accordance with EN ISO 13849-1:2008.</p> <p>In nonprogrammable electric/electronic control systems (e.g. relay, contactor, resistor), the safety related parts shall at least comply with PL "e" in accordance with EN ISO 13849-1:2008 or SIL 3 of EN 62061:2005.</p> <p>Programmable control systems shall satisfy SIL 3</p>				

		<p>of EN 62061:2005 or PLr "e" of EN ISO 13849-1:2008. If PLr "e" of EN ISO 13849-1:2007 is used the specification, design and coding shall be diverse.</p> <p>Main contactors shall be provided in duplicate to fulfil PLr "e" of EN ISO 13849-1:2008 or SIL 3 of EN 62061:2005. Faults in the main contactors shall be detected and lead to lockout in accordance with EN 60204-1:2006.</p> <p>For requirements of position switches, see 5.2.11.</p>				
	5.2.6.4.2	<p>Hand-fed machines with electronic braking systems shall have a mechanical back-up brake. The mechanical brake torque shall be greater than the maximum electric drive torque of the rectifier and inverter drive.</p>				
	5.2.6.5	<p>Cordless controls shall be in accordance with 9.2.7 of EN 60204-1:2006. An automatic stop in accordance with EN 60204-1:2006 shall be activated when correct control signals are not received, including loss of communication."</p>				
	5.2.7	<p>Indicators, marking, actuators, prestart warning devices</p>				See below
	5.2.7.1	<p>The requirements relating to indicating, marking and actuators as defined in EN 61310-1:1995 and EN 61310-2:1995 shall be satisfied.</p>				
	5.2.7.2	<p>On machines where overall vision is restricted and communication between operating personnel is difficult, prestart warning devices shall be provided which positively give a clearly distinguishable audible signal before the machine starts. The requirements defined in Annex B shall be satisfied. In addition to an audible warning device, one or more visual warning devices may be required.</p> <p>Overall vision may be restricted and communication between operating persons be difficult</p> <ul style="list-style-type: none"> if the machine length exceeds 7 m, or if, on printing machines, there is more than one printing unit side frame and the machine height, measured from floor level, exceeds 1,6 m, or if, on automatic platen machines, the control panels are in positions from which the waste discharge area cannot be observed. <p>Where prestart warnings are frequent, the stipulations defined in 5.3 of EN ISO 12100-2:2003 shall be taken into consideration.</p>				Prestart warning device is provided
	5.2.7.3	<p>Machines shall be provided with at least one operating element for starting and stopping. This function can also be achieved by a power supply disconnecter mounted on the machine. Control switches for starting and stopping and their related operating elements shall satisfy the requirements of EN 60204-1:2006 and 3.7.8 of EN ISO 12100-2:2003.</p>				

5.2.7.4	Operating elements of control switches for starting hazardous movements shall be safeguarded against unintended actuation.				
5.2.7.5	Machines shall be provided with separate main control switches for each type of energy used. The requirements of EN 1037:1995 shall be satisfied.				
5.2.7.6	For emergency stopping devices, the requirements of EN 13850:2007 and EN 60204-1:2006 shall be satisfied."				
5.2.8	Two-hand controls				
5.2.9	Electrosensitive protective devices (ESPDs)				
5.2.10	Pressure sensitive mats, trip devices				
5.2.11	Safety position switches				
5.2.11.1	The requirements of clauses 5 and 6 of EN 1088:1995 shall be satisfied.				
5.2.11.2	For safety position switches built in accordance with EN 60947-5-1:1997 and installed in accordance with EN 60204-1:2006, it may be assumed that malfunctions are not likely to occur. For machines where routine and regular access is not required, it is therefore sufficient to provide only one position switch for each interlocking guard.				
5.2.11.3	Short circuits between two electric wires outside the switch cabinet due to physical impacts can be prevented by mechanical protection of the cable (for example locating within ducts, in the machine frame).				
5.2.12	Work platform, access stairs, passageways and raised workplaces				
5.2.12.1	General requirements				
5.2.12.2	Additional means for infrequently used access platforms				
5.2.13	Stability during all phases of use (transportation, assembly and dismantling)				
5.2.13.1	Machines shall be so designed and equipped that no unforeseeable changes of position can occur. The requirements of EN ISO 12100-2:2003 shall be satisfied. Unforeseeable changes of position are prevented, for example, by adequate dimensioning of base; low centre of gravity; means for anchoring; adequate design of wheels on track-mounted assemblies.				
5.2.13.2	Movable machines (machines on wheels) shall be safeguarded against unintended travel. Unintended travel of wheels and castors with no brakes may, for example, occur on the following machines: small UV dryers, damping water devices, jogging tables, sheet folding, riveting, stitching and eyeleting machines, strapping and tying machines, bundling presses, printer slotters,				

		<p>rotary die-cutters and combined machines (in-line).</p> <p>Unintended travel is prevented, for example, if</p> <ul style="list-style-type: none"> out of four wheels, at least one, out of two wheels and two castors, at least one castor, out of four castors, at least two <p>can be locked.</p> <p>Where possible, automatic locking devices should be fitted, such as self-locking gears, for example.</p>				
	5.2.14	High contact temperatures				
	5.2.15	Noise				
	5.2.16	Radiation hazards				See details as following
	5.2.16.1	<p>Laser devices incorporated in machinery shall comply with the requirements of EN ISO 11553-1:2008 and EN 60825-1:1994. The equipment shall be provided with fixed or interlocking guards in order to prevent access to positions where laser radiation emission is above the category 1 limit values according to EN 60825-1:1994 during the intended use of the machine. For reasons of repair, it may be necessary for trained personnel to operate the machine for short periods of time without fixed or interlocking guards. If this requires access to positions where laser radiation emission is above the category 1 limit values, additional safety measures need to be taken in accordance with EN 60825-1:1994.</p> <p>Additional safety measures are, for example, instructing personnel in the use of personal protective equipment.</p> <p>For user information, see clause 7.</p>				
	5.2.16.2	<p>The level of ultraviolet radiation emitted by machinery shall not exceed category 1 limit values of Table D.1 of EN 12198-1:2000 for permanent workplaces as well as for occasionally occupied positions.</p> <p>Actual radiation values shall be determined according to Annex D.1 and Table D.2 of EN 12198-1:2000.</p> <p>The values specified for category 1 in Annex D.1 of EN 12198-1:2000 relate to the maximum duration of exposure of 8 hours per day. Where the location of measurement points or normal conditions of operation allow the expected time of exposure t_{exp} per person to be less than the maximum duration, the UV-B/C radiation limit value $1 \times 10^{-3} \text{ W/m}^2$ may be multiplied by the factor $8/t_{exp}$ (t_{exp} in hours).</p> <p>The UV-A radiation limit value is 10 W/m^2 for exposure times from 1 000 s to 8 hours. If the exposure time is less than 1 000 s, the limit value for radiation emission is calculated by dividing the radiation value of $10\,000 \text{ J/m}^2$ by the exposure time defined in seconds.</p> <p>A lower maximum duration of exposure may be expected on UV exposing equipment, for example, where the emission of radiation is interrupted for procedural reasons in the preparatory phase of the</p>				

		exposing operation (feeding of the copy, travel to required position). Hazards due to ozone caused by UV radiation shall be avoided at the design stage. Possible measures for reducing ozone emission are low-ozone UV lamp units or provision of exhaust equipment.				
	5.2.17	Immunity to electromagnetic disturbances				Electric components are CE certified
	5.3	Common devices				
	5.3.1	Stationary knives				
	5.3.2	Rotary tools				
	5.3.2.1	On rotary tools such as circular cutters, perforating knives, perforating tools, rotary slitting tools, rotary bending tools, circular saws, the inrunning nips and that part of the peripheral area which is not used for the process shall be protected against contact. Preference shall be given to guards which do not have to be removed for tool change. The requirements of 5.2.1.1 shall be satisfied as far as possible.				Guards are provided.
	5.3.2.2	Split rotary tools shall be positively fastened to the tool carrier.				
	5.3.3	Dangerous tools				
	5.3.4	Feeding units, delivery units (pile lifting and lowering devices)				
	5.3.4.1	The pile lifting and lowering device shall be designed such that it can withstand a static load test with a load of 1,25 times the maximum load capacity without showing permanent deformations or apparent defects. It shall withstand a dynamic load test with a load of 1,1 times the maximum load capacity under normal operating conditions. If the required tests are not done during the type testing of the device or if the pile lifting and lowering device will not be assembled at the manufacturer premises in the form in which it is to be used, then every unique device shall be tested at the manufacturer or at the place of use.				
	5.3.4.2	On pile lifting and lowering devices with production format sizes over 2,5 m ² , the breaking strength of the steel link chains shall be at least 6 times the permissible static load; on pile lifting and lowering devices with production format sizes below 2,5 m ² , it shall be at least three times the permissible static load. Calculations shall be based on a specific density of at least 1 400 kg/m ³ for paper and at least 200 kg/m ³ for corrugated board.				
	5.3.4.3	On pile lifting and lowering devices with production format sizes over 2,5 m ² and a lifting height over 1,5 m, provisions shall be made to prevent the pile carrier from moving more than 100 mm in the event of failure of a rope, chain, supporting nut or				

		<p>gear drive or leaking hoses or pipes.</p> <p>The requirement is satisfied for screw drives, for example, by providing an additional nut of the same type as the supporting nut in order to back up the supporting nut in the event of a breakage or thread wear. The requirement is satisfied for chains (or ropes), for example, by providing one or more unloaded double chains which take over the load and function of the operating chain in the event of a chain breakage.</p> <p>This does not apply to gears which are rated for double load. This does not apply to pile lifting and lowering devices with a hydraulic or pneumatic drive if, in the event of leakage in the pipe system, the lowering speed of the pile carrier does not accelerate to more than 1,5 times the speed under normal operating conditions.</p>				
	5.3.4.4	<p>On pile lifting and lowering devices with production format sizes over 2,5 m², the area below the pile carrier plate shall be safeguarded by guards or by ESPDs. EN 999:1998 need not be considered. For ESPDs, the requirements of 5.2.9.4 shall be taken into consideration.</p>				
	5.3.4.5	<p>On pile carrier plates, the danger points between the edges of the pile carrier plate and the place where the operator may stand shall be safeguarded as follows:</p> <p>a) on feeders with production format sizes of up to 1,0 m² and on delivery units with production format sizes of up to 0,175 m², the pile carrier plate shall be allowed to lower automatically</p> <ul style="list-style-type: none"> only down to a height of 120 mm above the base of operation and; further down to the base only in the hold-to-run control mode. <p>Danger points may alternatively be safeguarded by one of the measures listed under b).</p> <p>b) on feeders with production format sizes of over 1,0 m² and on delivery units with format production sizes of over 0,175 m², one of the following protective measures shall be provided in order to safeguard the exposed edges of the pile carrier plates:</p> <ul style="list-style-type: none"> resilient, non-switching, overhanging shields mounted on the pile carrier plate with their forward edges protruding over the hazardous edges by at least 250 mm (see !Figure 8"); ESPDs in front of the pile carrier plate edges, EN 999:1998 need not be considered. a horizontal distance of 300 mm between the vertical projection of the machine frame and the pile carrier plate; the projecting parts of the machine frame shall not be higher than 1,5 m above the base. Carrier arms projecting into the safety distance (300 mm) shall be at least 120 mm above the base (see !Figure 9") trip devices 				

		<p>hold-to-run control on feeders at a distance of at least 850 mm from the danger point and at a position from where the danger point is in the operator's view.</p> <p>c) on feeders and delivery units with production format sizes over 2,5 m², the danger point on the pile carrier plate edges shall be safeguarded by one or more of the following safety devices:</p> <ul style="list-style-type: none"> guard, ESPDs in front of the edge of the pile carrier plate, on board feeder and delivery units by an ESPD fitted at a distance of 300 mm minimum from the edge of the pile carrier plate. 				
	5.3.4.6	<p>Where platforms or catwalks are fitted to the feeding or delivery unit, the danger point between platform or catwalk and the edge of the pile carrier plate shall be safeguarded. This can be achieved, for example, by one of the following measures:</p> <ul style="list-style-type: none"> minimum distance of 120 mm between pile carrier edge and edge of platform, ESPDs in front of the pile carrier edge, EN 999:1998 need not be followed, horizontal distance of 300 mm between the vertical projection of outer edge of the machine frame and pile carrier edge with deflecting parts of the machine frame arranged at a distance of no greater than 1,5 m above platform or catwalk, trip devices. 				
	5.3.4.7	<p>On sheet feeding and delivery units, the crushing and shearing points caused by the upward movement of the pile or pile carrier plate shall be safeguarded. Safeguarding may, for example, be done by one of the following measures:</p> <ul style="list-style-type: none"> safety distances in accordance with EN 349:1993, trip devices, guards, hold-to-run operation. 				
	5.3.4.8	<p>Separating elements on feeders shall be so designed that their movement does not create danger points. Where blanks are fed from the bottom of the pile, safeguarding is achieved, for example, by residual pile monitoring on feeders. The danger points on separating elements outside the side lays on feeders shall be safeguarded for every format size used. This may be achieved, for example, by using concertina-type bellows or additional guards.</p> <p>Where blanks are fed from the top of the pile, the requirement is satisfied if safety distances between suction heads are used or if suction heads touch down only under spring force.</p>				
	5.3.4.9	<p>Danger points on suction head drives (see Figure 10) that can be accessed during the production process shall be safeguarded by guards completely enclosing the head, only leaving the bottom open.</p>				

		<p>Danger points caused by moving parts (such as forwarding sucker, lifting sucker) outside the suction head shall be safeguarded, for example, by one of the following measures:</p> <ul style="list-style-type: none"> distance of at least 25 mm between moving parts (for example, forwarding sucker) that are accessible during production, parts are moved only by springs with a non-hazardous low force (for example, pressure foot, lifting sucker), danger points (shearing and crushing hazards) are protected by guards. <p>The drive shaft of the suction head shall be completely enclosed.</p>				
	5.3.4.10	<p>Inrunning nips on the feedboard rollers on the sheet feeding system and on forwarding rollers shall be safeguarded (see !Figure 11"). This can be achieved, for example, by</p> <ul style="list-style-type: none"> using a deflection of 25 mm, using a deflection of 15 mm with roller widths limited to 25 mm or providing guards in accordance with 5.2.1.1 b). 				
	5.3.4.11	<p>On pile lifting and lowering devices (feeding and delivery devices), the following additional information shall be clearly marked:</p> <ul style="list-style-type: none"> a) permissible operating pressure on pneumatically-driven pile lifting and lowering devices; b) permissible operating pressure on hydraulically-driven pile lifting and lowering devices, as long as the pressure generator is not a component part of the pile lifting and lowering device; c) maximum carrying capacity; d) for format sizes above 2,5 m², a sign indicating that travelling on the device is forbidden. 				
	5.3.5	Reel unwinding and rewinding devices for webs				No hazard exists
	6	Verification of the safety requirements and/or protective measures				
	7	Information for use				See below
	7.1	Minimun requirements for machine markings				See below
	7.2	Instruction handbook				See file No. 7
	7.3	Warning signs and labels				See file No. 8

EN 1010-3:2002+A1:2009 TEST REPORT

Article	Sub-article	Requirement	Fulfilment			Remark
			Y	N	N/A	
1		Scope				
2		Normative references				
3		Terms and definitions				
4		List of significant hazards				
5		Safety requirements and/or measures				See following clauses for details
	5.1	General				Safety requirements are considered
	5.2	Pre-press machinery				
	5.2.1	<p>The electrical equipment of pre-press machinery shall satisfy the requirements of 5.2.5 of EN1010-3:2002+A1:2009.</p> <p>As a deviation from this requirement, for machinery which</p> <ul style="list-style-type: none"> – is used exclusively for the production of master copies, film and printing form exposure – may fall within the scope of "EN 60950-1:2006" and – it is ensured that they are not used in areas where printing on paper or paper converting takes place, <p>it is permitted to design the electrical equipment so that electrical hazards (such as burns or shocks) are prevented in accordance with EN 60950-1:2006 and electrical equipment has degree of protection IP 23 according to EN 60529:1991.</p> <p>As a deviation from 5.2.5.2 of EN 1010-1:2004+A1, it is permitted to equip pre-press machinery with supply disconnecting devices according to 5.3.2 d) or e) of EN 60204-1:2006.</p>				
	5.2.2	<p>Parts of the electric/electronic control system of pre-press machinery shall comply with 5.2.6.3 of EN1010-3:2002+A1:2009.</p> <p>Parts of the electric/electronic control system of machines and equipment for the preparation of printing forms may be designed in accordance with PLr c of EN ISO 13849-1:2008 or SIL 1 of EN 62061:2005 as a deviation from 5.2.6.3 of EN 1010-1:2004+A1. The control systems of interlocking devices for safety devices that prevent access to laser radiation class 3B or 4, classified according to EN 60825-1:2007, shall be designed to comply with PLr d of EN ISO 13849-1:2008 or SIL 2 of EN 62061:2005.</p>				

	5.2.3	Exposing equipment where there is a risk of injury caused by bursting lamps shall be equipped with safety screens of heat-resistant material which shall be attached free of stress.				
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		Safety screens are heat-resistant if they have an adequate mechanical strength at normal operating temperatures. Safety screens are "attached free of stress" if bursting of the screen is not to be expected even with the material expanding under increasing temperatures.				
	5.2.4	On UV exposing equipment, the limit values for UV radiation according to 5.2.16.2 of EN 1010-1:2004+A1: 2010 shall be complied with.				
	5.2.5	On laser equipment, the limit values for laser radiation according to 5.2.16.1 of EN 1010 1:2004+A1 shall be complied with.				
	5.2.6	Appropriate facilities shall be provided to ensure safe charging and discharging of developing and fixing liquid and arabic gum liquids. Appropriate facilities are, for example, suction pumps, filler sockets or funnels, valves for draining liquids, removable tanks with lips.				
	5.2.7	Pre-press machinery where hazards are to be expected shall be provided with appropriate facilities (for example, extraction devices) preventing hazards from contact with or inhaling hazardous substances such as solvents, solvent mist and dust. Any personal protection measures required shall be described in the instruction handbook. For reference in the instruction handbook, see 7.1.1.1.				
	5.2.8	On pre-press machinery, inrunning nips on rollers and cylinders shall be safeguarded in accordance with 5.2.1.1 of EN 1010-1:2004+A1. However, safeguarding is also considered adequate if the rollers are held in position only by their own force of 50 N maximum.				
	5.2.9	On engraving machines for gravure cylinders, the inrunning nip between gravure cylinder and engraving tool may be safeguarded by: <ul style="list-style-type: none"> - enclosing the gravure cylinder by an interlocking guard; - providing a fixed guard with a distance of 6 mm maximum between gravure cylinder and guard. The trapping hazard caused by the rotation of the gravure cylinder shall be safeguarded. This may be done, for example, by: <ul style="list-style-type: none"> - enclosing the gravure cylinder by an interlocking guard; - using a cylinder with a smooth surface including cylinder fixtures and drive elements; - enclosing individual trapping points by fixed or interlocking guards. 				
	5.2.10	Risk of skin and eye injuries are created by copper swarf adhering to the hands. This residual risk shall be described in the instruction handbook. For reference in the instruction handbook, see 7.1.1.2.				
	5.2.11	On printing form bending machines, the movement of the bending unit shall be				

		<p>safeguarded. This may be done by providing:</p> <ul style="list-style-type: none"> - guards in accordance with 5.2.1.1a) of EN1010-3:2002+A1:2009 or - two-hand control in accordance with 5.2.8.1, 5.2.8.2 and 5.2.8.4 of EN 1010-1:2004+A1:2010. <p>The control system of the machine shall comply with 5.2.6.3 of EN 1010-1:2004+A1." On printing form bending machines, safety check valves shall be provided directly on the lifting cylinders of the bending device if breakage of hoses or loss of pressure of the respective source of energy can create crushing hazards with a crushing force of at least 500 N.</p>				
	5.2.12	<p>On printing form punching devices, the movement of the punching tool shall be safeguarded. This may be done by:</p> <ul style="list-style-type: none"> - designing the opening width of fixed punching tools in accordance with EN ISO 13857:2008 ("Safe tools") and - protecting the drive elements of the punching tools by guards in accordance with 5.2.1.1.a) of EN1010-3:2002+A1:2009. 				
	5.3	Sheet-fed printing presses and varnishing machines (except screen printing presses)				
	5.3.1	<p>This clause applies to sheet-fed printing presses following the principle of offset, digital, gravure, flexo or letter press printing. The basic layout is illustrated in Figure 1. For screen printing presses, see 5.5.</p> <p>Inrunning nips on rollers, cylinders, numbering and perforating tools as well as drawing-in, crushing and shearing points on sheet gripping devices, sheet transport systems, exposing devices, measurement and control devices shall be safeguarded in accordance with 5.2.1.1 a) of EN1010-3:2002+A1:2009. As a deviation, inrunning nips on smooth cylinders and rollers may be guarded in accordance with 5.2.1.1 b) of EN1010-3:2002+A1:2009.</p> <p>Interlocking with guard locking is required where the action of opening the guard when moving from its safeguarding position up to the position reached when the position detector is actuated (stopping the machine) is not in compliance with Table 2.</p> <p>Interlocking with guard locking is also required where the hazardous movement cannot be stopped within at least 10 s after actuation of the position detector.</p>				
	5.3.2	<p>Where inrunning nips on cylinders in the vicinity of points on the machine that are directly accessible after the interlocking guards have been opened and where frequent interventions need to be carried out which cannot be done with the machine at standstill (such as cleaning and setting-up or changing of printing plates), trip devices in accordance with 5.2.10.1 of EN 1010-</p>				

		<p>1:2004+A1 shall be used. For such trip devices, the requirements of PLr d of EN ISO 13849-1:2008 or SIL 2 of EN 62061:2005 shall be satisfied and the interlocking system shall be designed such that the requirements for stopping paths specified in 5.2.10.2 of EN 1010-1:2004+A1:2010 are satisfied. Trip devices shall be designed such that cylinder gaps cannot be accessed without operating the trip device to stop cylinder movement before the inrunning nip is reached, if necessary using cylinder covers to control access around the trip device.</p> <p>Use of trip devices is, for example, not possible on small-size offset presses where trip devices would impede access to the cylinder for plate changing, for example. As a deviation, inrunning nips may be guarded according to 5.2.1.1.b) of EN1010-3:2002+A1:2009 on smooth cylinders and rollers and on cylinders and rollers with cut-outs or elevations in the radial direction of 4 mm maximum and with axial gaps in the circumferential direction of 8 mm maximum, without sharp or cutting edges (see Figure 2). Cylinder gaps shall be as small as possible.</p> <p>Where not all danger points are safeguarded by trip devices or guards according to 5.2.1.1 b) of EN 1010-1:2004+A1:2010, sheet-fed printing presses and varnishing machines shall only be allowed to be started under hold-to-run control according to 5.2.3.2 a)1) of EN 1010-1:2004+A1:2010 with a limitation of displacement of 25 mm maximum or with a speed limited to 1 m/min maximum. As a deviation, the machines may be started under hold-to-run control according to 5.2.3.2 a)2) of EN 1010-1:2004+A1:2010 with a limitation of displacement of 75 mm maximum or with a speed limited to 5 m/min maximum if direct access to unprotected inrunning nips on cylinders or unprotected danger points on the sheet transport system is not possible. Starting for continuous runs shall not be possible." Cylinders within the meaning of this standard are plate cylinders, blanket cylinders, impression cylinders or transfer cylinders. Ink rollers and damping water rollers, for example, are not considered cylinders within the meaning of this standard. Sheet transport systems are, for example, gripping systems, transport drums.</p> <p>Direct access is, for example, possible where inrunning nips can be reached after falling in or where nips are located in the immediate vicinity of places where setting-up or cleaning operations are to be carried out.</p> <p>On small-size sheet-fed presses, movements can be non-powered.</p> <p>Continuous run is starting the machine with a self-holding actuating element (other than hold-to-run), for example, for running the machine at a</p>				
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		reduced speed or for cylinder positioning where the cylinder stops at a predetermined position.				
	5.3.3	The machine control system shall comply with 5.2.6.3 of EN 1010-1:2004+A1:2010.				
	5.3.4	Closing the interlocking guard on damping or varnishing devices may initiate the rotation of damping or varnish ductor rollers or dosing rollers if it is ensured that at this time no danger points can be accessed. This also applies to ink duct rollers on flexo printing presses. Closing the interlocking guard shall not cause the printing press to restart its operation. Restarting the varnish, ink or damping ductor roller may be necessary in order to prevent malfunctions due to dried-up varnish or damping agents or ink on the flexo printing unit. Separate drives may be provided for ductor rollers and dosing rollers.				
	5.3.5	Emergency stop buttons shall be provided on each printing and varnishing unit where press motion controls are located and in the area of the operating position of feeder and delivery. Actuation of an emergency stop button shall not cause stopping of the ink, damping and varnish ductor roller where this is required for operational reasons and if all danger points are safeguarded, i. e. <ul style="list-style-type: none"> - inrunning nips on the ink ductor roller even with the ink fountain swung down are not accessible or - all inrunning nips on the damping and the varnish ductor are safeguarded by interlocking guards, possibly in combination with fixed guards. This shall be mentioned in the instruction handbook.				
	5.3.6	Actuators shall comply with 5.2.7.1 of EN 1010-1:2004+A1: 2010. Hold-to-run controls for forward and backward movement shall be designed such that erroneous actuation is prevented. This can be achieved, for example, by shrouding the "backward" control button or by using different surfaces.				
	5.3.7	On sheet-fed offset printing presses with a format width of 750 mm maximum, it is acceptable to provide, where required as a deviation from 5.2.12 of EN1010-3:2002+A1:2009, a single step for access to the platform fitted between units (printing units, varnishing units, delivery units) under the following conditions: <ul style="list-style-type: none"> - the difference in height between floor or catwalk and platform is not more than 750 mm and - the depth of the step is at least 250 mm, the width at least 300 mm and - the step is fitted half-way between floor or catwalk and platform and - suitable handles are provided. 				

5.3.8	<p>In the sheet delivery area, unintended access to the moving parts of the sheet gripper system from the top and from all sides shall be prevented by fixed or interlocking guards. Such guards shall reach down at least to the lower edge of the sheet gripper system. Residual risks due to the possibility of gaining access under the guards (for example, for test sheet removal or for inserting pile wedges) shall be mentioned in the instruction handbook (see 7.1.2.2).</p>				
5.3.9	<p>On sheet deliveries, measures are required on all sides with possible access to prevent persons from entering the area of the circulating sheet gripper elements:</p> <ul style="list-style-type: none"> - where the access height h is 800 mm or more (see Figure 3) or - where whole-body access is needed more than once a week. The necessity of whole-body access is restricted to cases where make-ready and cleaning can only be done by a person entering the area. 				
5.3.9.1	<p>Safeguarding whole-body access by ESPDs for machines with a single access level.</p>				
5.3.9.1.1	<p>The photoelectric beams of the ESPD shall be arranged as shown in Table 3. The horizontal distance of photoelectric beams from the circulating gripper system elements, according to EN ISO 13855:2010, need not be taken into consideration because the primary safeguarding function is the prevention of an unexpected start-up of the machine. In addition, free access to the danger points is prevented or made difficult by the outline of the machine, by the delivery pile carrier and possibly by the pile itself so that the stopping time need not be taken into consideration. For reference to residual risks in the instruction handbook, see 7.1.2.3.</p>				
5.3.9.1.2	<p>For removing test sheets, inserting pile wedges and aligning the pile, for pile travel and the entire process of pile removal including insertion of empty pallets and running in of auxiliary devices (such as forklift trucks), time-limited bypassing of one or more light beams is allowed only if the following conditions for individual bypassing functions are met. The duration of individual bypassing shall not exceed 20 s. After this time, the bypassed light beam shall be automatically reactivated. Bypassing individual light beams shall be possible only under the conditions listed under 5.3.9.1.2.a) to e). For reference in the instruction handbook, see 7.1.2.3.</p> <p>a) Bypassing function for test sheet removal Bypassing the top light beam (Figure 3, item 3) in the area of test sheet removal acting on the test sheet removal device shall be</p>				

		<p>possible only</p> <ul style="list-style-type: none"> - during sheet transport and - if the light beams on all other sides of access of the delivery are active. For monitoring sheet transport and the test sheet removal device as well as related signal processing, only single-channel processing is required, for example, by means of an electronic control system. <p>b) Bypassing function for insertion of pile wedges and pile alignment Bypassing one of the top light beams (Figure 3, item 3) by actuating a button provided on the respective side of access shall be possible only if</p> <ul style="list-style-type: none"> - there are 3 light beams provided for safeguarding the access side and - the light beams on all other access sides are active. <p>With the bypassing function active and the main drive at standstill, start-up shall be prevented.</p> <p>c) Bypassing function for insertion of empty pallets and handling of auxiliary devices Bypassing one of the lowermost light beams (Figure 3, item 1) by means of a button provided on the respective access side shall be possible only if</p> <ul style="list-style-type: none"> - there are 3 light beams provided for safeguarding the access side and - access to the danger zone is prevented by some kind of auxiliary device (for example, racks, blinds, barrier boards) or similar devices and - on all access sides, all top and centre light beams and, on all other access sides, all lower light beams are active and - the lifting height of the pile carrier plate is 120 mm maximum. <p>With regard to the above-mentioned light beams, requirements for electrical interlocking are fulfilled if the auxiliary device, or similar device, is interlocked such that the auxiliary device, when being run in, will automatically actuate the safety switch. The control system of the switch shall comply with PLr d of EN ISO13849-1:2008 or SIL 2 of EN62061:2005.</p> <p>d) Automatic bypassing function for pile removal Bypassing the light beams on the pile removal side shall be allowed only where the direction the pile is heading for, i.e. from the safeguarded area in the direction of the delivery area, can be detected.</p> <p>Directional detection can be achieved by using a sensing device (ultrasonic device, light beams or similar devices), for example, which is located inside the delivery area, i.e. behind the ESPD.</p>				
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		<p>The sensing device shall not be easy to manipulate. This can be achieved by an adequate positioning of the sensing device or by checking signal plausibility. Linking to the control system may be on a single-channel basis, for example, by an electronic control system.</p> <p>e) Manual bypassing function for insertion of empty pallets and running in auxiliary devices By-passing the light beams on the pile removal side by means of the "pile removal" button on the respective removal side shall be allowed only if</p> <ul style="list-style-type: none"> – the machine is in motion and – the lifting height of the pile carrier plate is 120 mm maximum and <p>- since the most recent pile removal and the most recent triggering/malfunction, sheet transport has taken place and has been detected as such and</p> <ul style="list-style-type: none"> – there are 3 light beams provided for safeguarding the access side and – all top, centre and lowermost light beams on all other access sides are active during the entire process. <p>The bypassing function shall fulfil the following requirements:</p> <ul style="list-style-type: none"> – bypassing is restricted to the lowermost light beam (Figure 3, item 3) on the respective removal side <p>for a maximum duration of 20 s;</p> <ul style="list-style-type: none"> – a sensing device capable of detecting the pile removal for the duration of this period is provided and the light beams on the removal side are bypassed for a duration of 20 s maximum; – automatic reactivation of light beams 2 and 3 (Figure 3, items 2 and 3) is ensured after this time (20 s maximum); – the lowermost light beam (Figure 3, item 1) is allowed to be bypassed for another 20 s maximum for insertion of the empty pallet; – during this period (20 s maximum), the lowermost light beam shall only once be allowed to be muted <p>for a second time (Figure 3, item 1) for another duration of 20 s maximum by repeated actuation of the "pile removal" button;</p> <ul style="list-style-type: none"> – automatic reactivation of the lowermost light beam (Figure 3, item 1) is ensured after the maximum bypassing period. 				
	5.3.9.1.3	<p>The bypassing function initiated (triggered automatically or by actuation of a button) shall be indicated by a yellow indicator lamp to warn the operator. The end of bypassing can be indicated by flashing the yellow light. Interruption of a light beam shall be indicated by a red warning lamp, active monitoring without bypassing the safeguarding function by a green indicator lamp. Indicator lamps shall be located on the respective access side. Linking to the control system may be on a single-channel basis, for example, by an</p>				

		electronic control system.				
	5.3.9.1.4	On machines with several access levels (for example, machines with movable platforms), the safety measures described under 5.3.9.1.1 to 5.3.9.1.3 shall apply to each access level (see Figures 4 and 5).				
	5.3.9.2	<p>As an alternative to safeguarding by means of ESPDs in accordance with 5.3.9.1, safeguarding whole-body access can also be achieved by one of the following measures:</p> <ul style="list-style-type: none"> – fixed and interlocking guards; – pressure-sensitive mats; – laser scanners. <p>Whole-body access to sheet gripper systems is considered safe under the following operating conditions:</p> <ul style="list-style-type: none"> – while the delivery system is separated from the drive by means of clutches. Re-engaging the clutch and re-start shall not lead to hazardous movements; – while, as a result of the pile carrier plates being in lifted position or auxiliary devices (such as) or similar devices being run in, the height of access to the danger zone of the sheet gripping system does not exceed 160 mm; – while the machines runs with substrates with the pile carrier plate in the lifted position or auxiliary devices (racks, blinds, barrier boards) or similar devices run in and with an access height above the main or auxiliary pile carrier of 300 mm maximum. Pile carrier presence shall be detected either at the point of insertion under the gripper system or when a lowering path of 160 mm is reached at the latest. Restart from the standstill position shall not be possible without additional safety measures; – restarting the machine from standstill can be prevented by providing horizontal light beams positioned below the gripping systems. The clearance between individual light beams shall not be more than 40 mm. Light grids shall comply with EN ISO 13855:2010, otherwise a safety device as specified under 5.3.9 is required. If none of the above conditions apply, it shall not be possible to operate the delivery without additional guards against access to the danger zones. <p>For example, if the auxiliary device has not been detected by position switches in a lowering path of 160 mm, access to the danger zones shall be safeguarded by alternative safety devices such as light beams or the movement of the gripper system shall be stopped.</p>				
	5.3.9.3	Each time one of the safety devices for protecting whole-body access has been activated, hazardous movements shall be allowed to be restarted only by means of a reset button. The				

		<p>position of the reset button shall be such that the danger zone is in the view of the operator when actuating the reset button and that reaching the button from inside the danger zone is adequately prevented. This requirement is achieved if the reset button is located outside the danger zone at a distance of at least 400 mm from the lower edge of the delivery housing and not lower than the lower edge of the delivery housing (see Figure 6).</p> <p>After switching on the ESPDs (for example when connecting the machine by means of the main power supply switch), machine start-up shall only be possible after actuating the reset button.</p> <p>Actuating the reset button is not required where the type of safety device used safely ensures detection of persons inside the danger zone (for example, laser scanners).</p> <p>Actuation of the reset button shall not automatically start the machine. The movements of the main and auxiliary pile carrier systems are allowed to be restarted by the reset button only if the entire danger area can be overlooked from the position of the reset button.</p> <p>On machines with several levels of access (for example, machines mounted on a raised platform), where visibility of the danger zone cannot be ensured from any position, additional reset buttons shall be provided to allow the enabling function for respective danger zones.</p>				
	5.3.10	<p>On machines with an access height (on the delivery side) of more than 800 mm (according to 5.3.9) safeguarding shall be provided – in addition to safeguarding the pile carrier plate edge in accordance with 5.3.4.5 of EN 1010-1:2004+A1: 2010 – also for the access to the area below the pile carrier plate and any other device used for lowering the pile on the delivery side. Safeguarding shall be achieved by guards or by safeguarding the danger zone by ESPDs as described in 5.3.9.1. Alternatively, for the arrangement of the beams, 5.2.9.4 of EN 1010-1:2004+A1: 2010 shall be taken into account.</p> <p>Hold-to-run control is also considered as a suitable safety measure if the operator has adequate view of the danger zone. The bypass functions as described in 5.3.9.1.2 also apply for safeguarding the danger zone below the pile carrier systems.</p>				
	5.3.11	<p>On the delivery of sheet-fed printing presses and varnishing machines with pile carriages, where the pile weight does not exceed 500 kg and safeguarding in accordance with 5.3.4.5 of EN1010-3:2002+A1:2009 cannot be done for operational reasons, the crushing hazards to the toes shall be safeguarded by ensuring a distance of 50 mm between the lower pile carrier plate edge and floor in accordance with EN</p>				

		349:1993+A1:2008. It is also required that the lowering movement shall be possible only with the printing press operating in continuous mode or under hold-to-run control. For stability reasons, drive wheels shall be mounted as far as possible towards the centre of the pile carriage.			
	5.3.12	On sheet-fed printing presses which are used for printing on board, sheet metal or other inflexible materials, it may be that for production reasons "EN ISO 13857:2008" cannot be applied in the feeding area. The height of the material feeding aperture shall be as small as possible, but shall not exceed 20 mm. The residual risk shall be specified in the instruction handbook (see 7.1.2.4). On sheet-fed flexographic printing presses, the feed opening between the side lays and the sides of the machine shall be guarded by means of adjustable or self-adjustable guards.			
	5.3.13	Automatic format setting operations may be carried out without additional safety measures up to a setting speed of 0,5 m/min, however, if there is no crushing hazard to the head or the trunk of the body. Otherwise, format setting shall only be possible under hold-to-run control. The location of the hold-to-run control shall allow the operator to overlook the danger points. Automatic format settings are used, for example, to adjust sheet side lays or positioning suction heads. Additional safety measures are: – fixed or interlocking guards; – provision of trip devices; – safety distances according to EN ISO 13857:2008 and minimum distances according to EN 349:1993+A1:2008; – limitation of force.			
	5.3.14	Where the movement of pile changing devices causes a crushing hazard between any or all of the pile changing device, the pile lifting and lowering device, the paper pile and fixed machine parts, safeguarding shall be provided by one of the following measures: – fixed or interlocking guards in accordance with 5.2.1.1.a) of EN1010-3:2002+A1:2009; – ESPDs in accordance with 5.2.9.1 of EN 1010-1:2004+A1: 2010; – safety distances in accordance with EN 349:1993+A1:2008"; – hold-to-run control in accordance with 5.2.3.2.a) 2 of EN1010-3:2002+A1:2009; – trip devices in accordance with 5.2.10 of EN1010-3:2002+A1:2009. - For trip devices, the requirements of PLr d of EN ISO 13849-1:2008 or SIL 2 of EN 62061:2005 shall be satisfied.			

5.3.15	<p>Where heavy machine parts with a lifting load of at least 25 kg per person need to be installed and removed regularly for operational reasons, appropriate load lifting devices shall be supplied. Heavy machine parts are, for example, screen rolls and form cylinders. Lifting devices may even be required for lower loads if unfavourable body postures make lifting difficult. For reference in the instruction handbook, see 7.1.2.1.</p>				
5.3.16	<p>Powered movable guards shall not create danger points. In order to achieve this, the forces applied by the guard shall be restricted to: a) 50 N maximum for sharp-edged parts; b) 150 N maximum for flat parts.</p>				
5.3.17	<p>On offset proofing presses, the inrunning nip between the movable upper unit and the fixed lower unit or printing table shall be safeguarded. This is achieved by the provision of trip devices or ESPDs. Trip devices shall satisfy the requirements of 5.2.10 of EN 1010-1:2004+A1 and PLr d of EN ISO 13849-1:2008 or SIL 2 of EN 62061:2005. ESPDs shall comply with 5.2.9.1 of EN 1010-1:2004+A1: 2010. The safety device shall cause stopping of the upper unit in time not to cause any risk of injury. The hand approach speed specified in EN ISO 13855:2010 need not be complied with. The inrunning nips on the inking and damping rollers on the movable upper unit and the fixed lower units shall be safeguarded in accordance with 5.2.1.1 of EN1010-3:2002+A1:2009.</p>				
5.3.18	<p>On laser exposing equipment, the limit values for laser radiation according to 5.2.16.1 of EN 1010-1:2004+A1: 2010 shall be complied with.</p>				
5.3.19	<p>Damage to health due to hazardous printing powders shall be prevented by restricting the intended use of the machine to the use of non-hazardous printing powders (toners). Where this is not possible and persons may be endangered, provisions shall be made for extraction systems with adequate dust separation equipment and filters or powders shall only be used in totally enclosed systems. Printing powders (toners) are, for example, used in digital printing presses. Any restriction in the use of the machine shall be indicated in the instruction handbook (see 7.1.2.6).</p>				
5.3.20	<p>Requirements for platforms, passageways and catwalks shall comply with 5.2.12 of EN 1010-1:2004+A1: 2010. The usable width of machine catwalks shall be at least 0,5 m. For catwalks fitted at a height of more than 0,3 m, adequate means of access shall be provided. Where the difference in height does not exceed</p>				

		<p>1,6 m, a toe board is not required if</p> <ul style="list-style-type: none"> – the respective level is not required for taking up auxiliary means required for production reasons and – operational intervention below that level is not required under the intended use. <p>In such cases, the intermediate rail shall be centred between the hand rail and the platform floor.</p>				
	5.3.21	<p>Plates of material with a low slip-resistance capability (for example, glass) fitted in access floors to allow the operator to observe the production process are permissible if they are fitted at a distance of at least 200 mm from the nearest fall-off edge (for example, access stairs) and the accessible area of such materials does not exceed 18 000 mm² with a maximum width of 90 mm. Calculations or tests shall be carried out to verify that a static load of 1 500 N applied to an area of (50 50) mm in the centre of such material will not lead to damage.</p>				
	5.3.22	<p>Where a passage height of 2 m cannot be provided for spatial reasons, the protruding parts shall be padded and provided with a danger marking.</p>				
	5.3.23	<p>The machine shall be designed in such a way that risks from hazardous materials and substances, for example by inhalation or skin or eye contact, will be avoided. This shall be achieved by closed technical processes or exhaust systems for ink mist, varnish mist in the area of the printing and coating units and for ozone in the area of the drying systems. The measuring location shall be at a distance of 1 m and at a height of 1,65 m from the face of the delivery. Typical emission values for hazardous materials and substances and the measurement conditions are given in Annex A.</p>				
	5.4	<p>Web-fed rotary printing presses and varnishing machines</p>				
	5.4.1	<p>General</p> <p>This clause applies to web-fed printing presses following the principle of offset, digital, gravure, flexo or letter press printing. The basic layout is illustrated in Figure 7.</p>				
	5.4.2	<p>Inrunning nips on rollers and cylinders as well as drawing-in, crushing and shearing points on folding units, subsequent processing units, exposing devices, measurement and control devices as well as danger points on the side fixing and clamping elements of plate and blanket cylinders shall be safeguarded in accordance with 5.2.1.1.a) of EN1010-3:2002+A1:2009.</p> <p>Interlocking with guard locking is required where the opening width of the guard when moving out of its safeguarding position up to the position reached when the position detector is actuated (stopping</p>				

		<p>the machine) is not in compliance with Table 2 (see 5.3.1).</p> <p>Interlocking with guard locking is also required where the hazardous movement cannot be stopped within at least 10 s of the actuation of the position detector.</p>				
	5.4.3	<p>As a deviation from 5.4.2, inrunning nips may be guarded according to 5.2.1.1 b) of EN 1010-1:2004+A1: 2010 on smooth cylinders and rollers, on knurled rollers and on cylinders and rollers with cut-outs or elevations in the radial direction of 4 mm maximum and with axial gaps in the circumferential direction of 8 mm maximum, without sharp or cutting edges (see Figure 2). Cylinder gaps shall be as small as possible. This kind of safeguarding may also be used for newspaper offset printing presses (see Figure 8) with cylinder gaps of up to 19 mm. Efforts shall be made to limit cylinder gaps to 12 mm.</p> <p>As a deviation from EN1010-3:2002+A1:2009, the clearance between cylinder or roller and guard should be 4 mm maximum. Where the 4 mm clearance is not applicable on account of the format size (deflection of guards) or not technically feasible due to the impression ON and OFF movements of the cylinders or rollers, the clearance may be 6 mm.</p>				
	5.4.4	<p>After opening interlocking guards, the machine shall only be started under hold-to-run control in accordance with 5.2.3.2.a) of EN 1010-1:2004+A1: 2010 unless all danger points are safeguarded by trip devices or guards according to 5.4.3. All danger points shall be within the view of the operator actuating the hold-to-run device. Inrunning nips which are not in the view of the operators holding the hold-to-run controls depressed shall be safeguarded by the following measures:</p> <ul style="list-style-type: none"> – a guard in accordance with 5.2.1.1.b) of EN1010-3:2002+A1:2009 or – a sweep-on nip bar on the delivery side between the two blanket cylinders of a rotary offset printing press with electrical interlocking provided between the position of the nip bar and the backward motion. <p>On machines with varying web paths, where such measures for safeguarding the inrunning nip existing between blanket cylinders during the reverse movement are not feasible, the following measures are allowed for safeguarding the reverse movement under hold-to-run control:</p> <ul style="list-style-type: none"> – hold-to-run speed not exceeding 3 m/min and – maximum movement of 1,2 cylinder revolutions and – a stop control element with mechanical latch or an emergency stopping device in the immediate vicinity of the inrunning nip and 				

		<ul style="list-style-type: none"> – a modified audible warning signal and – a red flashing light that can be seen during the signal and release time and a red permanent warning light during operating time of the hold-to-run control as warning signal in the immediate vicinity of any inrunning nip that cannot be overlooked. 				
	5.4.5	<p>Powered movable guards shall not create danger points. In order to achieve this, the forces applied by the guard shall be restricted to:</p> <ul style="list-style-type: none"> a) 50 N maximum for sharp-edged parts; b) 150 N maximum for flat parts. 				
	5.4.6	<p>Actuators shall comply with 5.2.7.1 of EN 1010-1:2004+A1: 2010. Hold-to-run controls for forward and backward movement shall be designed such that erroneous actuation is prevented. This can be achieved, for example, by shrouding the "backward" control button or by using different surfaces.</p>				
	5.4.7	<p>The control system of the machine shall comply with 5.2.6.3 of EN1010-3:2002+A1:2009.</p>				
	5.4.8	<p>Closing the interlocking guard on inking, damping or varnishing devices may initiate the rotation of damping or varnish doctor rollers or dosing rollers if it is ensured that at this time no danger points can be accessed. This also applies to ink doctor rollers on flexo printing presses. Closing the interlocking guard shall not cause the printing press to restart its operation.</p> <p>Restarting the ink, varnish or damping doctor roller may be necessary in order to prevent malfunctions due to dried-up varnish, damping agents or ink on flexo printing units. Separate drives may be provided for doctor rollers and dosing rollers.</p>				
	5.4.9	<p>Emergency stop buttons shall be provided in the area of the unwinding unit, on each printing and varnishing unit where press motion controls are located, in the area of the folding unit, the sheeting unit and the cutting unit. Actuation of an emergency stop button shall not cause stopping of the ink, damping and varnish doctor roller and dosing rollers where their movement (rotation) is required for operational reasons and if all danger points are safeguarded, i. e.</p> <ul style="list-style-type: none"> – inrunning nips on the ink duct roller even with the ink fountain swung down are not accessible or – all inrunning nips on the damping and the varnish doctor roller and the dosing roller are safeguarded by interlocking guards, possibly in combination with fixed guards. <p>Reference shall be made in the instruction handbook (see 7.1.3.2).</p>				
	5.4.10	<p>Automatic format setting operations may be carried out without additional safety measures up to a setting speed of 0,5 m/min, however, if there is no crushing hazard to the head or the trunk of</p>				

		<p>the body. Otherwise, format setting shall only be possible under hold-to-run control. The location of the hold-to-run control shall allow the operator to overlook the danger points. Additional safety measures are:</p> <ul style="list-style-type: none"> – fixed or interlocking guards; – trip devices; – safety distances in accordance with EN ISO 13857:2008 and minimum distances in accordance with EN 349:1993+A1:2008; – force limitation. <p>In the turner bar area of the format setting device, a separate emergency stop device may be provided which will cause the automatic movement of the turner bars to stop. Stop buttons shall be identified as such.</p>				
	5.4.11	<p>Where heavy machine parts with a lifting load of at least 25 kg per person need to be installed and removed regularly for operational reasons, appropriate load lifting devices shall be supplied. Heavy machine parts are, for example, screen rolls and form cylinders. Lifting devices may even be required for lower loads if unfavourable body postures make lifting more difficult. For reference in the instruction handbook, see 7.1.3.1.</p>				
	5.4.12	<p>Carriages for transporting cylinders shall be resistant against tilt and be secured against unintended travel (see 5.2.13.2 of EN 1010-1:2004+A1: 2010). Where- carriages are moved manually, handles shall be provided. Cylinders on the carriage shall be secured against falling by means of</p> <ul style="list-style-type: none"> – securing supports or – safety stirrups. <p>When dismantling form cylinders, carriage travel beyond the dead-end position shall be safely prevented by mechanical stops.</p>				
	5.4.13	<p>Where transport carriages are driven automatically and cylinders handled automatically, the danger points between fixed and movable parts shall be safeguarded by one of the following measures:</p> <ul style="list-style-type: none"> – trip devices and/or ESPDs; – hold-to-run control as defined in 5.2.3.2 of EN1010-3:2002+A1:2009 where danger points are within the operator's view from the location of the hold-to-run control; – safeguarding the danger zone as described in 5.2.3.5 of EN1010-3:2002+A1:2009. 				
	5.4.14	<p>On folding units, where access is required in the start-up phase of a production run for operational reasons (for example, for removing waste sheets), it is permitted for printing speeds up to 8 m/min to open the interlocking guard for a duration of 15 s maximum without stopping the</p>				

		<p>machine as long as a hold-to-run button mounted close to the guard is held depressed. When releasing the hold-to-run button whilst the guard is still open, the hazardous movement shall be stopped with the shortest possible stopping path. This principle may also be applied to several guards on the condition that each is related to a separate hold-to-run button which is held depressed.</p> <p>Signal processing of the button, the reduced printing speed and the time limitation shall comply with 5.2.6.3.1 of EN1010-3:2002+A1:2009.</p>				
	5.4.15	<p>If the requirements of EN ISO 13857:2008 cannot be met on web-fed rotary presses in the area where the web is fed into individual print units, a safety distance of 200 mm shall be observed for gaps with a width of more than 20 mm and less than 30 mm.</p>				
	5.4.16	<p>If web material runs over passageways, the height of passage shall be at least 2 m. If this is not possible for spatial reasons and there is a risk of injury to face and neck, web edges shall be safeguarded by a guard with black/yellow marking.</p>				
	5.4.17	<p>Where ESPDs in accordance with 5.3.5.11 of EN1010-3:2002+A1:2009 are used for safeguarding the automatic reel loading area on unwinding units, the device may be muted (for muting see EN 61496-1:2004) while material reels or containers with unwound cores are transported through the area safeguarded by the ESPD on the following conditions:</p> <ul style="list-style-type: none"> – an additional ESPD (see Figure 9, item 3) is provided at a height of not more than 50 mm of the largest reel diameter that will cause immediate stopping of all hazardous movements on the unwinding unit whenever the beam of the ESPD is interrupted during insertion of the material reel or removal of unwound cores, caused, for example, by persons accessing the danger area (see Figure 9) and – emergency stop controls shall be provided within easy reach on the unwinding unit that will also stop the automatic loading operation. 				
	5.4.18	<p>On forms printing presses, starting the machine with guards open by two-hand control shall be possible with a speed higher than 10 m/min where this is required for production reasons and the following requirements are fulfilled:</p> <ul style="list-style-type: none"> – interlocking in according with 5.2.3.6 of EN1010-3:2002+A1:2009; – selector switch for this kind of operation; – hold-to-run speed as low as possible under production circumstances. <p>For reference in the instruction handbook, see 7.1.3.3.</p>				
	5.4.19	<p>Rollers rotating the same direction do not create a hazardous inrunning nip if the rollers have the</p>				

		same surface characteristics and circumferential speeds (see Figure 10). Inrunning nips existing between the guide roller and fixed parts of the machine shall be safeguarded in accordance with 5.2.1.1 of EN1010-3:2002+A1:2009.				
	5.4.20	Exhaust fans for the removal of paper dust shall be fitted on the clean side, i. e. following the dust separator. A warning signal shall be provided to indicate the need for removal of the dust collector bin.				
	5.4.21	For digital presses for printing on web-type substrates, 5.3.15 to 5.3.17 similarly apply.				
	5.4.22	Requirements for platforms, passageways and catwalks shall comply with 5.2.12 of EN 1010-1:2004+A1: 2010.				
	5.4.23	The usable width of machine catwalks shall be at least 0,6 m. For catwalks fitted at a height of more than 0,3 m, adequate means of access shall be provided. Where the difference in height does not exceed 1,6 m, a toe board is not required if – the respective level is not required for taking up any auxiliary means that are required for production reasons and – operational intervention below that level is not required during the intended use. In such cases, the intermediate rail shall be centred between the hand rail and the platform floor.				
	5.4.24	On stairs with several flights, the platform shall be at least 800 mm long. Where this is not possible due to spatial restrictions in old buildings at the user's site, it may be reduced to 600 mm as a minimum.				
	5.4.25	For access to infrequently used workplaces where access by means of stairs or stepladders is not possible, a fixed ladder may be used in accordance with 4.4.1.1 and 4.4.1.2 of EN ISO 14122-4:2004 if the access height does not exceed 2 m. Such workplaces may dispense with toe boards and intermediate rails if they are located in front of, between or behind printing unit towers. Hand rails shall be designed such that they can be swept to the inside or upwards in order to allow free access/exit.				
	5.4.26	Where a passage height of 2 m cannot be provided for spatial reasons, the protruding parts shall be padded and provided with a danger marking.				
	5.4.27	Mobile, hand-operated platforms provided between stationary machine units do not require any fall-off protection on the machine side if the clear distance between machine and platform does not exceed 200 mm (see Figure 11). For platforms with a height of more than 1,5 m where the distance exceeds 70 mm, toe boards shall be provided as minimum protection.				

<p>5.5 5.5.1</p>	<p>Screen printing presses</p>	<p>As a deviation from 5.2.4.2 of EN 1010-1:2004+A1: 2010, explosion prevention and protection measures on screen printing presses are not required even when screen printing inks with a flash point of 40 °C to 55 °C are being used. The necessity to provide adequate air ventilation in the working area shall be pointed out in the instruction handbook (see 7.1.4.1).</p> <p>The use of screen printing inks with a flash point below 40°C, shall be in accordance with 5.2.4 of EN1010-3:2002+A1:2009.</p> <p>For reference in the instruction handbook, see 7.1.4.1</p>				
<p>5.5.2</p>		<p>The crushing point between the printing unit and machine frame (table) or printing basis shall be safeguarded (see Figure 12). This can be done by:</p> <p>a) Trip devices Trip devices shall be arranged such that their operation is positively ensured each time the gap between screen printing frame and machine table is accessed. Hazardous reaching over the bar shall be prevented. The force to operate the bar shall be 300 N maximum (dynamic).</p> <p>b) ESPDs The arrangement of ESPDs shall take account of the hand approach speed as defined in EN ISO 13855:2010. Such devices shall be arranged so that it is not possible to access the machine between two adjacent beams or to defeat them.</p> <p>c) Limiting the closing force of the screen printing frame to a non-hazardous low level. An acceptable level is 300 N maximum, if there are no crushing hazards due to sharp edges.</p> <p>d) Fixed guards Fixed guards can be provided, for example, on that side of the machine where access for feeding and ink replenishment is not required. "EN ISO 13857:2008" shall be complied with. Residual risks caused by the absence of the screen or when using smaller screens shall be described in the instruction handbook (see 7.1.4.5).</p>				
<p>5.5.3</p>		<p>On screen printing presses with a short stroke of the printing unit, additional safeguarding is required for the crushing, shearing and impact points created by the movable feeding table and the gripper system.</p> <p>For safeguarding the impact hazard caused by the movable printing table, one of the following measures is required:</p> <ul style="list-style-type: none"> – interlocking device (for example nip bar) to prevent access to the danger zone (area of travel of the feeding table). The interlocking device shall be positioned such that it is easily disengaged 				

		<p>when the table recedes into the final position. A distance of 120 mm minimum shall remain between table and bar;</p> <ul style="list-style-type: none"> – trip bar on the front of the movable printing basis, designed in such a way that the displacement is more than the stopping path of the printing basis; – pressure-sensitive mats preventing or safeguarding presence in or access to the danger zone. <p>Crushing and shearing hazards between the machine frame and the printing table shall be safeguarded by one of the following measures:</p> <ul style="list-style-type: none"> – overlapping of printing table and machine frame; – lining plate covers to prevent access (minimum distance between plate cover and lower edge of printing table of 6 mm maximum); – minimum distances in accordance with EN 349:1993+A1:2008. <p>Crushing and shearing hazards between moving gripper elements and fixed machine parts shall be safeguarded by one of the following measures:</p> <ul style="list-style-type: none"> – minimum distances in accordance with EN 349:1993+A1:2008; – guards; – limitation of forces acting on movable parts of 150 N maximum. 				
	5.5.4	<p>The crushing point between doctor blade and screen printing frame shall be safeguarded. This can be done by adjusting the stop gauge such that a minimum distance of 25 mm between doctor blade and screen frame is ensured. Where various sizes of screen frames are used, the instruction handbook shall give advice on the proper adjustment of stop gauges (see 7.1.4.3).</p>				
	5.5.5	<p>Crushing hazards caused by the movement of the doctor blade shall be safeguarded. This can be done by using the safety distances defined in EN ISO 13857:2008 between doctor blade and fixed parts of the printing press. Where the descending doctor blade causes crushing points between doctor blade and printing table or printing cylinder respectively and where such crushing points cannot be safeguarded for operational reasons, the instruction handbook shall contain a warning of the residual risk existing, for example, when replenishing ink (see 7.1.4.4). The lifting path of the doctor blade shall be as short as possible. The crushing point between doctor blade and printing table or printing cylinder on screen printing presses can generally not be safeguarded if ink replenishing is to be done manually.</p>				
	5.5.6	<p>Where access between screen printing frame and machine frame is required (for example, for cleaning the screen) a control element shall be provided in addition to the measures described</p>				

		under 5.5.2 which, when actuated, prevents unintended start-up of the machine. The instruction handbook shall indicate that the control element shall be actuated before starting cleaning operations (see 7.1.4.2).				
	5.5.7	Automatic feeding and delivery systems on screen printing presses shall comply with the requirements of 5.3.4 of EN1010-3:2002+A1:2009.				
	5.5.8	On cylinder screen printing presses, safeguarding is required for the crushing point between the movable screen frame and fixed machine parts (see Figure 13). This can be achieved by: – minimum distances in accordance with EN 349:1993+A1:2008 or – interlocking guards or – ESPDs. ESPDs shall be provided over the entire machine length (without feeding and delivery) on the drive as well as on the operating side. The ESPD light beams shall be arranged such that reaching through, over and around is prevented. EN ISO 13857:2008 shall be complied with. For ink replenishment during production runs, time-limited muting of the ESPD shall not exceed 2 min. The requirements for muting given in EN 61496-1 shall be satisfied. The residual risks existing when muting the ESPD shall be indicated in the instruction handbook (see 7.1.4.6).				
	5.5.9	On cylinder screen printing presses, the inrunning nip on the printing cylinder shall be safeguarded. This can be achieved by: – interlocking guards or – guarding by the printing form (screen). Where the printing form is used as means of guarding, additional measures are required, for example, for lifting and removal of the printing form. Such additional measures can be electrical interlocking which allows cylinder rotations only under hold-to-run control according to 5.2.3.2 of EN1010-3:2002+A1:2009 as long as the printing form is lifted.				
	5.5.10	The safety-related parts of the control system shall comply with at least 5.2.6.3 of EN 1010-1:2004+A1: 2010. Trip devices shall comply with 5.2.10.1, sentence 1 and 2, and 5.2.10.2 of EN 1010-1:2004+A1:2010. Emergency stopping devices shall be on each operating position.				
	5.5.11	As a deviation from 5.5.10, the following requirements shall be satisfied on screen printing presses where substrates are fed manually between printing form and printing table: – The safety-related parts of the control system shall comply with at least 5.2.6.4 of EN 1010-1:2004+A1: 2010; – trip devices shall satisfy PLr e of EN ISO 13849-1:2008 or SIL 3 of EN 62061:2005 in				

		<p>addition to the requirements in 5.5.8;</p> <ul style="list-style-type: none"> – ESPDs shall comply with 5.2.9.2 of EN 1010-1:2004+A1: 2010. <p>Manual feeding of the substrate between printing form and printing table is used on several types of semi- and three-quarter automatic screen printing presses.</p>				
	<p>5.6 5.6.1</p>	<p>Auxiliary devices for printing and varnishing machines</p> <p>General</p> <p>Auxiliary devices that are built into printing and varnishing machines and prevent access to danger points in the built-in position shall be fitted so that they can be removed only by means of tools. However, where such devices are to be removed frequently or for make-ready (see 5.2.2.3 of EN 1010-1:2004+A1), the guarding position of the device shall be electrically interlocked with any hazardous movement by means of position switches according to EN 1088. Where machines are also used without auxiliary devices, alternative safety devices shall be supplied by the manufacturer which shall be fitted in the absence of the auxiliary devices.</p> <p>Where auxiliary devices are built into printing and varnishing machines, the buttons of the emergency stop controls of the printing and varnishing machine shall act upon the auxiliary device. Where provided, emergency stop controls on auxiliary devices shall stop the hazardous motion of the printing and varnishing machine.</p> <p>As a deviation from 5.2.5.2 of EN 1010-1:2004+A1: 2010, auxiliary devices for printing and varnishing machines may be equipped with supply disconnecting devices according to 5.3.2 d) or e) of EN 60204-1:2006.</p> <p>The safety-related parts of the control system shall comply with at least 5.2.6.3 of EN 1010-1:2004+A1: 2010.</p> <p>Trip devices shall comply with 5.2.10.1, sentence 1 and 2, and 5.2.10.2 of EN 1010-1:2004+A1: 2010.</p> <p>Emergency stopping devices shall be provided at each operating position from which hazardous movements can be started.</p>				
	<p>5.6.2 5.6.2.1</p>	<p>Cylinder and roller washing devices</p> <p>Where automatic cylinder and roller washing devices are fitted into printing presses, explosion prevention and protection measures otherwise required due to the washing solvent being used shall not be implemented because explosive concentrations cannot build up when spraying the solvent, if</p> <ul style="list-style-type: none"> – the flash point of the washing solvent is at least 55 °C and no mist occurs 				

		<p>or</p> <ul style="list-style-type: none"> – the flash point of the washing solvent is at least 40 °C and the amount of washing solvent used does not exceed 0,08 l per printing unit and washing cycle. <p>The instruction handbook shall indicate the importance of correct adjustment of washing parameters and the residual hazard (see 7.1.5.1).</p>				
	5.6.2.2	<p>It shall be possible to adjust washing equipment in such a way as to make sure that solvent vapours are prevented, thus avoiding contact and inhaling of solvent vapours.</p> <p>The instruction handbook shall indicate the importance of correct adjustment of washing parameters and the residual hazard (see 7.1.5.1).</p>				
	5.6.2.3	<p>Safe replenishing of the washing agent in the tank shall be ensured. This requirement is satisfied if washing agent tanks are designed such as to allow one person handling the equipment properly to replenish the washing agent without the hazard of spilling or overflowing.</p> <p>Tank overflow when replenishing the washing agent can be avoided by providing the possibility of checking the filling level (tank full indicators, inspection glasses, adequate openings for filling).</p>				
	5.6.2.4	<p>Where washing devices are disconnectable by the user, the lines for supplying the washing agent that are to be shut off during removal shall be safeguarded against leakage of washing agents. This requirement is satisfied by providing self-locking hose couplings.</p>				
	5.6.3 5.6.3.1	<p>Continuous-flow drying devices</p> <p>Where continuous-flow drying devices are fitted on printing presses together with automatic cylinder and roller washing devices, any risk of explosion when solvent vapours and mists set free during the washing process are heated up by the drying unit shall be avoided. This requirement is fulfilled</p> <ul style="list-style-type: none"> – where the design of the continuous-flow drying unit takes account of the solvent vapours and mists in accordance with 5.7.2 of !EN 1539:2009" or – by interlocking the washing and the drying devices so as to allow starting of the washing operation only if the dryer temperature is at a non-hazardous degree and to prevent starting of the drying device until there is no risk of explosion of the flammable solvent vapours or – by sealing the feeding openings of the drying device in order to prevent solvent vapours from penetrating into the dryer or – by providing, in accordance with 6.2.3.3 of EN 1127-1:2007, an exhaust in compliance with 5.2.4.5, 5.2.4.8, 5.2.4.11 and 5.2.6.3.1.1 of EN 1010 1:2004+A1, which dilutes the vapour/air mixture 			<p>UV dry equipment has been manufactured according EN standard.</p>	



		below 50 % LEL, thus reducing the risk of explosion."			
5.6.3.2	<p>Where continuous-flow drying devices are fitted on printing presses together with automatic cylinder and roller washing devices, any risk of ignition due to leakage of the solvent in the washing device being heated up shall be avoided. This requirement is fulfilled if</p> <ul style="list-style-type: none"> – leakages according to 6.2.3.2 of EN 1127-1:2007 are avoided by providing hosing and connections of adequate endurance or washing devices and hosing are positioned so that, if leakages occur, the solvent cannot reach the continuous flow drying device. <p>Hosing and connections of adequate endurance are, for example, permanently fitted, adequately dimensioned pipes of a material that is suitable for the solvent used.</p> <p>The instruction handbook shall indicate that solvents shall be prevented from penetrating into the dryer area (see 7.1.6.2).</p>				UV drying equipment is far away from the cleaning equipment.
5.6.3.3	<p>Continuous-flow drying devices built into printing and varnishing machines where flammable substances are set free during the drying and/or curing process of the ink or varnish shall satisfy the requirements 5.7.2 of EN 1539:2009.</p> <p>Emission of flammable substances, for example, shall not be expected where inks and/or varnishes are used for which the safety data sheet indicates that the explosion limit is "not applicable". Where the use of such inks and/or varnishes is required in order to comply with the requirements stated, this shall be indicated in the instruction handbook (see 7.1.6.1).</p> <p>Emission of flammable substances from solvents in the ink during the drying process may, for example, be expected on gravure and screen printing presses, solvent-based flexo printing presses and heat set dryers. This will, however, not be the case when using commercial offset printing inks (for example, cold set inks) which are absorbed by the substrate.</p>				No flammable substance is used.
5.6.3.4	<p>On continuous-flow drying devices, any hazards from emission of flammable substances shall be avoided that are caused by the substrate transporting solvents out of the automatic cylinder and roller washing device.</p> <p>This requirement is satisfied on a sheet-fed printing press by electrically interlocking the cylinder and/or roller washing device with the paper transport system so that paper transport during the washing process is prevented and can be restarted only after the cylinders are sufficiently dry.</p> <p>On web-fed rotary printing presses with integrated continuous-flow drying devices where washing takes place with the web in the machine, blanket</p>				No flammable substance is used.

		washing and/or other operations in which there is a controlled input, higher than normal operation input, of releasable flammable substances into the dryer/oven shall only be carried out where the forced-ventilation flow rate (exhaust flow rate) has been correctly adjusted to suit the maximum admissible concentration prior to the controlled input, higher than normal operation input existing (see 5.7.2.1.1 of EN 1539:2009).			
	5.6.3.5	Ignition of the substrate by the continuous-flow drying device shall be prevented. This can be achieved by reducing the dryer performance when the printing process is stopped and by ensuring that the substrate (for example, sheets) is adequately separated from the radiation source by air blades or deflectors.			Substrate is adequately separated from the radiation source by air blades or deflectors.
	5.6.3.6	The surface temperature of those parts of continuous-flow drying devices where access is possible from the outside shall not exceed the limit values in accordance with 5.2.14 of EN1010-3:2002+A1:2009. Those parts of continuous-flow drying devices which are accessible after opening the interlocking device and where temperatures are in excess of limit temperatures shall be provided with a danger warning.			
	5.6.3.7	On UV continuous-flow drying devices, any hazards caused by the emission of UV radiation shall be prevented by satisfying the requirements of 5.2.16.2 of EN1010-3:2002+A1:2009. In the sheet delivery area of sheet-fed printing presses, a maximum exposure time t_{exp} of 4 hours shall be taken as a basis for the calculation.			UV dry equipment has been manufactured according EN standard.
	5.6.3.8	On UV continuous-flow drying devices, any hazards caused by the generation of ozone shall be prevented. This can be achieved by using devices with low ozone radiation or by providing exhaust systems. Such exhaust systems shall be designed such that they act on the source of radiation as directly as possible. UV lamps shall be operated only when the exhaust system is switched on. The function of the exhaust system shall be monitored, i. e. failures in the exhaust system shall cause automatic stopping of the substrate feeding system (for example, feeders on sheet-fed printing presses) or printing shall be stopped (for example, on web-fed rotary printing presses). It shall be ensured that the drying device stops automatically after the drying of the substrate (for example, the last sheet) is finished. The control system for monitoring the function of the exhaust system shall satisfy at least PLr c of EN ISO 13849-1:2008 or SIL 1 of EN 62061:2005.			UV dry equipment has been manufactured according EN standard.
	5.6.3.9	On printing presses fitted with UV drying systems, hazards from ink mists shall be excluded in normal use. Where this is not possible, technical measures shall be provided such as ink mist			

		exhaust systems. For reference in the instruction handbook, see 7.1.6.3				
	5.6.4	Powder spraying devices Where print powder is dusted on, safe replenishing of the print powder during the printing process shall be ensured. This is achieved by locating the filling aperture such that danger points in the machine cannot be reached.				
	5.6.5	Auxiliary devices on inking and damping units				
	5.6.6	Plate clamping devices				
	5.6.7	Washing equipment for printing forms, rollers and doctor blades				
	5.6.8	Pile turners				
	5.6.9	Measuring and control devices				
6		Verification of the safety requirements and/or measures				
7		Information for use				
	7.1	Instruction handbook				
	7.1.1	Pre-press machinery				
	7.1.2	Sheet-fed printing presses and varnishing machines				
	7.1.3	Web-fed rotary printing presses and varnishing machines				
	7.1.4	Screen printing presses				
	7.1.5	Automatic cylinder and roller washing device				
	7.1.6	Continuous-flow drying devices				
	7.1.7	Alcohol-dosing devices				
	7.1.8	Washing equipment for printing forms, rollers and doctor blades				
	7.1.9	Pile turners				

TEST REPORT

EN 60204-1:2018 Safety of Machinery - Electrical Equipment of Machines Part 1: General Requirement

Name and address of the testing laboratory	Ouce International Certification and Inspection Group	
Name and address of the applicant	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the manufacturer	Zhejiang Baolong Machinery Company Limited No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	
Name and address of the factory (production sites)	Zhejiang Baolong Machinery Company Limited No.32, Jixian Road, Shanghui Industrial District Zone, Whenzhou City,Zhejiang, China	
Product	Automatic Die-cutting Machine	
Mode/type reference	BL-1050E,BL-1050S,BL-1050SS,BL-1050ET,BL-1050EH,BL-1050EHT,BL-1050SH,BL-1050SHT,BL-1050ST,BL-1050FC,BL-1050FCH,BL-1050FCTH,BL-1300FCT,BL-1300FCTH,BL-1650S,BL-1650SS	
Tested according to	EN 60204-1:2018	
Test Result	PASS	
Test Report No.	MD-TCF-24-01-2-4	
Work carried out by	Joe Ji	Signature 
	Director	
Word verified by	Kevin Shi	Signature 
	Manager	
Date of issue	2024/01/03	



3 IEC 60204-1 report

TEST REPORT IEC 60204-1 Safety of machinery - Electrical equipment of machines Part 1: General requirements	
Report reference No:	MD-TCF-24-01-2-4
Date of issue	2024-01-03
Total number of pages	50
Testing Laboratory:	
Address	
Applicant's name:	Zhejiang Baolong Machinery Company Limited
Address	No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China
Test specification:	
Standard.....:	EN 60204-1:2018
Test procedure	CB
Non-standard test method.....:	N/A
Test Report Form No:	IEC60204_1A
Test Report Form(s) Originator	OUCE
Master TRF.....:	Dated 2009-11
Test item description	Automatic Die-cutting Machine

Testing procedure and testing location:

Testing procedure: TMP
Tested by (name + signature) :
Approved by (+ signature)..... :
Testing location/ address :

Testing procedure: WMT
Tested by (name + signature) :
Witnessed by (+ signature) :
Approved by (+ signature)..... :
Testing location/ address :

Testing procedure: SMT
Tested by (name + signature) :
Approved by (+ signature)..... :
Supervised by (+ signature) :
Testing location/ address :

Testing procedure: RMT
Tested by (name + signature) :
Approved by (+ signature)..... :
Supervised by (+ signature) :
Testing location/ address :

Summary of testing:	
Tests performed (name of test and test clause): All of test are performed at: No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China	Testing location: No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone, Ruian City, Zhejiang, China
Summary of compliance with National Differences: N/A	
Copy of marking plate	

Test item particulars	
Classification of installation and use.....	Class I
Supply Connection	Terminal
.....	
.....	
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	Pass
- test object does not meet the requirement.....	Fail
Testing	
Date of receipt of test item	2024-01-03
Date (s) of performance of tests.....	2024-01-03
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p> <p>This test report include:</p> <p>Attachment to Test Report IEC60204-1, 5 page(s)</p>	

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
4	GENERAL REQUIREMENTS		-
4.1	General		-
	Hazards relevant to the electrical equipment are assessed as part of the overall risk assessment of the machine.		P
4.2	Selection of equipment		P
4.2.1	Electrical components/devices suitable for their intended use and applied in accordance with supplier's instructions.		P
4.2.2	Where possible electrical equipment in compliance with the IEC 60439series.		P
4.3	Electrical supply		P
4.3.1	Electrical equipment to be designed for correct operation within the conditions of mains power supply - as stated below (cl. 4.3.2 or 4.3.3)		P
	or as stated by the user (record specs in this TR)		N
	or as stated by the supplier ¹		P
4.3.2	AC supplies		P
	Supply Voltage: Steady state voltage: 0,9 ... 1,1 of nominal voltage		P
	Frequency: 0,99 ... 1,01 of nominal frequency continuously; 0,98 ... 1,02 short time.		P
	Harmonics: not exceeding 10 % of the total r.m.s. etc.		P
	Voltage unbalance: not exceeding 2% deviation.		P
	Voltage interruption: interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle with more than 1 s between successive interruptions.		P
	Voltage dips not exceeding 20 % of the peak voltage of the supply for more than one cycle with more than 1 s between successive dips.		P
4.3.3	DC supplies		N
	Supply Voltage: - other:0,85 to 1,15 of nominal voltage; - battery-operated vehicles: 0,7 to 1,2 of nom. volt. - from converting equipment: 0,9 to 1,1 of nom. volt.		N
	Voltage interruption: - other: not exceeding 5 ms - converting equipment: not exceeding 20 ms		N
	Ripple (peak-to-peak): not exceed. 0,15 of nom. volt.		N

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
4.3.4	Special supply systems; e.g. on board generators limits acc. 4.3.2 /3 exceeded, but equipment designed acc. exceeded limits.		N
4.4	Physical environment and operating conditions		P
4.4.1	Electrical equipment suitable for the physical environment and operating conditions of its intended use.		P
4.4.2	<p>Electromagnetic compatibility (EMC): Equipment shall not generate electromagnetic disturbances above levels that are appropriate for its intended operating environment and shall have a level of immunity to electromagnetic disturbances so that it can function in its intended environment (IEC 61000-6-1 or IEC 61000-6-2 and CISPR 61000-6-3 or IEC 61000-6-4 give general EMC emission and immunity limits.)</p> <p>Are there sufficient measures to limit the generation of electromagnetic disturbances, i.e. conducted and radiated provided? (E.g. power supply filtering; cable shielding; enclosures designed to minimize RF radiation; RF suppression techniques; design of functional bonding system, using conductors with low RF impedance and as short as practicable.</p>		P
4.4.3	Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. (Minimum requirement: air temperatures of +5 °C and +40 °C)		P
4.4.4	Electrical equipment shall be capable of operating correctly when the relative humidity is up to 50 % at a maximum temperature of +40 °C		P
4.4.5	Electrical equipment shall be capable of operating correctly at altitudes up to 1 000 m above mean sea level.		P
4.4.6	Electrical equipment shall be adequately protected against the ingress of solids and liquids (see 11.3)		P
4.4.7	Electrical equipment shall withstand ionizing and non-ionizing radiation.		P
4.4.8	Electrical equipment shall withstand vibration, shock and bump.		P
4.5	Electrical equipment designed to withstand the effects of transportation and storage within a temperature range of - 25 to + 55 °C.		P
4.6	Heavy or bulky electrical equipment of the machine provided with suitable means for handling.		P
4.7	Electrical equipment is installed and operated in accordance with the supplier's instruction.		P


IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
5	INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF		-
5.1	Incoming supply conductor terminal		P
5.1	Electrical equipment of a machine connected to one single power supply (For large complex machinery comprising a number of widely-spaced machines working together in a coordinated manner, there can be a need for more than one incoming supply depending upon the site supply arrangements)		P
	Power supply conductors terminated to main disconnecting device of electrical equipment (unless a plug is provided for disconnection)		P
	Neutral conductor clearly indicated in technical documentation with "N" (see cl. 16.1)		P
	No connection between neutral conductor and protective bonding circuit nor combined PEN-terminals. Exception: a connection may be made between the neutral terminal and the PE terminal at the point of the connection of the power supply to the machine for TN-C systems.		P
	All terminals of incoming supply clearly marked in acc. with cl. 16.1 (symbols acc. to EN60445)		P
5.2	Terminal for connection to external protective earthing system		P
	For each incoming supply, a terminal shall be provided in the vicinity of the associated phase conductor terminals for connection of the machine to the external protective earthing system or to the external protective conductor, depending upon the supply distribution system.		P
	Cross section of incoming PE conductor acc. to cl. 5.2, table 1. (Where an external protective conductor of a material other than copper is used, the terminal size shall be selected accordingly. See also 8.2.2).	1,5 mm ²	P
	Protective earth identified either by graphic symbol, letters "PE", or bicolour combination GREEN / YELLOW		P
5.3	Supply disconnecting device		-
5.3.1	A supply disconnecting device shall be provided: – for each incoming source of supply to a machine – for each on-board power supply.		P
5.3.2	Type of power supply disconnecting device:		
	a) Switch-disconnector, acc. to EN 60947-3 for appliance category AC-23 B or DC-23 B		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
	b) Disconnecter with or without fuses, with aux. contact (acc. to EN60947-3)		P
	c) Power circuit breaker suitable for isolation (acc. to EN 60947-2)		P
	d) any other switching device in accordance with an IEC product standard for that device and which meets the isolation requirements of IEC 60947-1 as well as a utilization category		P
	e) Plug/socket combination for electrical load (requirements see cl. 5.3.3)	No such construction	N
5.3.3	Disconnection device has to fulfil all of the following requirements		
	- isolate the electrical equipment from the supply and have only one OFF (isolated) and only one ON position marked with "O" and "I"		P
	- visible contact gap or a position indicator which cannot indicate OFF (isolated) until all contacts are actually open and the requirements for the isolating function have been satisfied		P
	- have an external operating means e.g. a handle (except power operated CB's)		P
	- coloured black or grey recommended (If used as an emergency stop, red/yellow combination selected)		P
	- be provided with a means permitting it to be locked in the OFF position (padlocks). When so locked, remote as well as local closing shall be prevented		P
	- disconnect all live conductors of its power supply circuit (For TN supply systems, the neutral conductor may or may not be disconnected except in countries where disconnection of the neutral conductor (when used) is compulsory.)		p
	Requirements for plug/socket combination as a disconnection device: - Breaking capacity of the plug/socket combination: sufficient to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads. - further see. cl. 13.4.5 a) to f)		N
5.3.4	The operating means are easily accessible and located between 0,6 m and 1,9 m above the servicing level.	1,25m	P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
5.3.5	<p>Only the following circuits need not be disconnected by the supply disconnecting device:</p> <ul style="list-style-type: none"> - lighting circuits for lighting needed during maintenance or repair; – plug and socket outlets for the exclusive connection of repair or maintenance tools and equipment; – under voltage protection circuits that are only provided for automatic tripping in the event of supply failure; – circuits supplying equipment that should normally remain energized for correct operation – control circuits for interlocking <p>Such circuits are provided with their own disconnecting device.</p>		N
	<p>Circuits not disconnected by the supply disconnecting device have:</p> <ul style="list-style-type: none"> - permanent warning labels in accordance with cl. 16.1 		N
	<ul style="list-style-type: none"> - a statement is included in the maintenance manual 		N
	<ul style="list-style-type: none"> - additionally one or more of the following is applied; - a permanent warning label in accordance with 16.1 is affixed in proximity to each excepted circuit, or - the circuit is separated from other circuits, or - the conductors are identified by colour taking into account the recommendation of Cl.13.2.4. 		N
5.4	Disconnecting devices to prevent of unexpected start-up:		
	<ul style="list-style-type: none"> - Devices for the prevention of unexpected start-up are provided <p>These devices are appropriate and convenient for the intended use, are suitably placed, and readily identifiable as to their function and purpose (for example by a durable marking in accordance with cl. 16.1).</p>		P
	<ul style="list-style-type: none"> - Means are provided to prevent inadvertent and/or mistaken closure of these devices either at the controller or from other locations 		P
	<ul style="list-style-type: none"> - Devices that do not fulfil the isolation function (e.g. a contactor switched off by a control circuit) are only used for situations that include: <ul style="list-style-type: none"> – inspections; – adjustments; – no hazardous work on the electrical equipment (for example replacement of plug-in devices without disturbing existing wiring) 		P
5.5	Devices for disconnecting electrical equipment		

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
	<p>- Requirements to devices for disconnecting electrical equipment to enable work to be carried out when it is de-energised and isolated:</p> <ul style="list-style-type: none"> - appropriate and convenient for the intended use; - suitably placed; - readily identifiable as to which part or circuit of the equipment is served (for example by durable marking in accordance with 16.1 where necessary). <p>- Additional means are provided to prevent of inadvertent and/or mistaken closure of these devices either at the controller or from other locations</p>		P
	<p>- Where it is necessary to work on individual parts of the electrical equipment of a machine, or on one of a number of machines fed by a common conductor bar, conductor wire or inductive power supply system, a disconnecting device is provided for each part, or for each machine, requiring separate isolation.</p> <p>In addition to the mentioned supply disconnecting device, the following devices that fulfil the isolation function may be provided for this purpose:</p> <ul style="list-style-type: none"> - devices described in 5.3.2; - disconnectors, withdrawable fuse links and withdrawable links only if located in an electrical operating area (see 3.15) and relevant information is provided with the electrical equipment (see 17.2 b)9) and b)12)). 		P
5.6	Protection against unauthorized, inadvertent and/or mistaken connection		
	For devices acc. to cl. 5.4(disconnecting electrical equipment) and 5.5 (prevention of unexpected start-up) locking means in OFF position are provided and no remote reconnection is possible.		P
	Where a non-lockable disconnecting device is provided (for example withdrawable fuse-links, withdrawable links), other means of protection against unintended energising are used.		P
	Where plug/socket combinations according to 5.3.2 e) are used for the purpose of prevention of unexpected start-up the are so positioned that they can be kept under the immediate supervision of the person carrying out the work.		P
6	PROTECTION AGAINST ELECTRIC SHOCK		-
6.2.2	Protection against direct contact		
	Live parts that are located inside enclosures have to be conform to the relevant requirements of Clauses 4, 11, and 14 and have to have a protection against direct contact of at least IP2X or IPXXB.		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
	Where the top surfaces of the enclosure are readily accessible, the minimum degree of protection against direct contact provided by the top surfaces shall be IP4X or IPXXD.	IP54	P
6.2.2 a	<p>Opening an enclosure (i.e. opening doors, lids, covers, and the like) is possible only when:</p> <p>a) Either the use of a key or tool is necessary for access and:</p> <ul style="list-style-type: none"> - all live parts, that are likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected are protected against direct contact to at least IP2X or IPXXB - live parts on the inside of doors are protected against direct contact to at least IP1X or IPXXA. 		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
6.2.2 b	<p>b) Or the opening of an enclosure (i.e. opening doors, lids, covers, and the like) is possible only if disconnection is provided for all live parts inside the enclosure before it can be opened.</p> <p>Exception: If a special device or tool (intended for use only by skilled or instructed persons) as prescribed by the supplier is provided that can be used to defeat the interlock and that intends that:</p> <ul style="list-style-type: none"> - it is possible at all times while the interlock is defeated to open the disconnecting device and lock the disconnecting device in the OFF position or otherwise prevent unauthorised closure of the disconnecting device; - upon closing the door, the interlock is automatically restored - all live parts, that are likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected are protected against direct contact to at least IP2X or IPXXB - live parts on the inside of doors shall be protected against direct contact to at least IP1X or IPXXA - relevant information is provided with the electrical equipment like instructions on the procedures for securing the machine for safe maintenance and information on the residual risks. - means are provided to restrict access to live parts behind doors not directly interlocked with the disconnecting means to skilled or instructed persons. - parts still alive after switching off are protected at least IP 2X or IP XXB and marked with a warning sign in accordance with 16.2.1  <p>Excepted from this marking are:</p> <ul style="list-style-type: none"> - parts that can be live only because of connection to interlocking circuits and that are distinguished by colour as potentially live in accordance with 13.2.4 - the supply terminals of the supply disconnecting device when the latter is mounted alone in a separate enclosure. 		P
6.2.2 c	<p>c) Or the opening without the use of a key or a tool and without disconnection of live parts shall be possible only when all live parts are protected against direct contact to at least IP2X or IPXXB. Where barriers provide this protection, either they shall require a tool for their removal or all live parts protected by them shall be automatically disconnected when the barrier is removed.</p>		P
6.2.3	Protection by insulation of live parts:		

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
	Live parts are completely covered with insulation that can only be removed by destruction and that is capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it can be subjected under normal operating conditions.		
	Paint, varnish lacquer etc. not used as the unique insulation layer.		P
6.2.4	Protection against residual voltages		
	Live parts with residual voltage greater than 60 V after a time period of 5 s after disconnection of the supply shall be discharged until this interferes with the proper functioning of the equipment. Except are components with charges of $\leq 60 \mu\text{C}$ (equivalent to capacitor with less then $1\mu\text{F}$ @ 60V).		P
	Where pins of plugs or similar devices after withdrawal are exposed, discharge time is $\leq 1\text{s}$. Otherwise such conductors are protected against direct contact to at least IP2X or IPXXB.	No such construction	N
	If above requirements cannot be achieved, additional disconnecting devices or appropriate warning devices shall be applied (e.g. warning acc. cl. 16.1).		P
6.2.5	For protection by barriers, 412.2 of IEC 60364-4-41 is applied.		N
6.2.6	For protection by placing out of reach, 412.4 of IEC 60364-4-41 shall apply. For protection by obstacles, 412.3 of IEC 60364-4-41 is applied.		P
6.3	Protection against indirect contact		-
6.3.2	Prevention of the occurrence of a touch voltage		
6.3.2.2	Protection by provision of: - class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation in accordance with IEC 61140) or - switchgear and control gear assemblies having total insulation in accordance with IEC 60439-1 or - supplementary or reinforced insulation in accordance with 413.2 of IEC 60364-4-41.		P
6.3.2.3	Protection by electrical separation. For this type of protection, the requirements of 413.5 of IEC 60364-4-41 apply.		P
6.3.3	Protection by automatic disconnection of supply.		
6.3.3 a)	Use of overcurrent protective device for automatic cut-off in the event of an insulation failure in a TN-System. Where disconnection within the time specified in Clause A.1 cannot be assured, supplementary bonding is provided as necessary to meet the requirements of Clause A.3.		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
6.3.3 b)	Use of residual current protective devices (RCD) for automatic cut-off in the event of an insulation failure in a TN - or TT -System.		P
6.3.3 c)	Use of earth fault detection device to initiate automatic disconnection in a IT-System.		P
6.4	Protection by the use of PELV		P
6.4.1 a)	PELV circuits shall satisfy all of the following conditions: -the nominal voltage does not exceed: • 25 V a.c. r.m.s. or 60 V ripple-free d.c. when the equipment is normally used in dry locations and when large area contact of live parts with the human body is not expected; or • 6 V a.c. r.m.s. or 15 V ripple-free d.c. in all other cases;		P
6.4.1 b)	one side of the circuit or one point of the source of the supply of that circuit is connected to the protective bonding circuit;		P
6.4.1 c)	live parts of PELV circuits is electrically separated from other live circuits		P
6.4.1 d)	Conductors of each PELV circuit are physically separated from those of any other circuit. If this requirement is impracticable, the insulation provisions of 13.1.3 are fulfilled;		P
6.4.1 e)	plugs and socket-outlets for a PELV circuit are conform to the following: 1) plugs do not to enter socket-outlets of other voltage systems; 2) socket-outlets do not admit plugs of other voltage systems.	No PELV plug and socket provided	N
6.4.2	Sources for PELV		
	The source for PELV shall be one of the following: - safety isolating transformer in accordance with IEC 61558-1 and IEC 61558-2-6 or - a source of current with a degree of safety equivalent to that of the safety isolating transformer or - an source independent of circuit with higher voltage - electronic power supply conforming to appropriate standards		P
6.1	Other measures from IEC 60364-4-41 are used. (Description!)		P
7.	PROTECTION OF EQUIPMENT		-
7.2.	Overcurrent protection Unless otherwise specified by the user, the supplier of the electrical equipment is not responsible for providing the overcurrent protective device for the supply conductors to the electrical equipment (see Annex B).		P

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Clause	Requirement - Test	Result - Remark	Verdict
7.2.2.	On the installation diagram data necessary for selecting the overcurrent protective device are stated for each incoming feeder. (see 7.2.10 and 17.4)		P
7.2.3	Power circuits:		
	Devices for detection and interruption of overcurrent, selected in accordance with 7.2.10, are applied to each live conductor. And, none of the following conductors, as applicable, is disconnected without disconnecting all associated live conductors: – the neutral conductor of a.c. power circuits; – the earthed conductor of d.c. power circuits; – d.c. power conductors bonded to exposed conductive parts of mobile machines.		P
	Cross section area of neutral conductor is at least equal to the phase conductor. No overcurrent protective/ disconnecting device is required. (For a neutral conductor with a cross sectional area smaller than that of the associated phase conductors, the measures detailed in 524 of IEC 60364-5-52 shall apply.)		P
	IT-Systems:, no neutral conductor is used. Or, when it is used, the measures detailed in 431.2.2 of IEC 60364-4-43 are applied.		P
7.2.4	Control circuits		
	Conductors of control circuits directly connected to the supply voltage and of circuits supplying control circuit transformers are protected against overcurrent in accordance with 7.2.3.		P
	Conductors of control circuits supplied by a control circuit transformer or d.c. supply: see 9.4.3.1		
7.2.5	Socket outlets and their associated conductors		
	Overcurrent protection is provided for the circuits feeding the general purpose socket.		P
7.2.6	Lighting circuits		
	Lighting circuits are protected separate from other circuits.		P
7.2.7	Transformers		

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Clause	Requirement - Test	Result - Remark	Verdict
	Transformers are protected in accordance with the manufacturer's instructions and includes: - avoiding tripping due to transformer magnetizing inrush currents - avoiding a winding temperature rise in excess of the permitted value for the insulation class when there is a short circuit at the secondary terminals. - type and setting of the overcurrent protective device in accordance with the recommendations of the transformer supplier.		P
7.2.8	Location of overcurrent protective devices:		
	- located at the point where a reduction in the cross sectional area of the conductors or another change reduces the current-carrying capacity of the conductors.		P
	<u>Exceptions:</u> - current carrying capacity of the conductors is at least equal to that of the load and - conductors between the point of reduction of current-carrying capacity and the position of the overcurrent protective device is ≤ 3 m and - the conductor is protected e.g. by an enclosure or duct.		P
7.2.9	Selection of overcurrent protective devices		
	The rated short-circuit breaking capacity I_{cn} is at least equal to the prospective fault current at the point of installation. Additional currents other than from the supply (e.g. from motors, from power factor correction capacitors) shall be taken into consideration.		P
	Reduced breaking capacity is permitted, where another protective device is installed at supply side with the necessary breaking capacity. (In that case, the characteristics of the two devices shall be co-ordinated so that the let-through energy (I^2t) of the two devices in series does not exceed that which can be withstood without damage to the overcurrent protective device on the load side and to the conductors protected by that device. See Annex A of IEC 60947-2).		N
	Where fuses are provided as overcurrent protective devices, a type readily available in the country of use shall be selected, or arrangements shall be made for the supply of spare parts.		P
7.2.10	Rating and setting of overcurrent protective devices:		
	Rated current of fuses or overcurrent setting of other protective devices selected as low as possible, but adequate for anticipated overcurrents.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	The rated current of overcurrent protective device is determined by the current carrying capacity of the conductors to be protected in accordance with Cl. 12.4, D.2 and the maximum allowable interrupting time t in accordance with Clause D.3, taking into account the needs of coordination with other electrical devices in the protected circuit.		P
7.3	Protection of motors against overheating		P
7.3.1	Overload protection for all motors provided for ratings of > 0.5 kW in continuous operation.		P
	Protective device may be omitted for motors, which cannot be overloaded.		P
	Exceptions: In applications where an automatic interruption of the motor operation is unacceptable (for example fire pumps), the means of detection shall give a warning signal to which the operator can respond.		P
7.3.2	Protection achieved by overload protection device: <ul style="list-style-type: none"> - detection in each live conductor - switching off of all live conductors (not necessary to switch of neutral conductor) 		P
	For special duty motors, appropriate protective devices are recommended		P
7.3.3	Protection achieved by over-temperature protection device: Is recommended in situations where the cooling can be impaired (for example dusty environments)		P
7.3.4	Protection achieved by current limiting protection: Where protection against the effects of overheating in three phase motors is achieved by current limitation, the number of current limitation devices may be reduced from 3 to 2.		P
7.4	Abnormal temperature protection: Resistance heating or other circuits that are capable of attaining or causing abnormal temperatures and can cause a hazardous situation are provided with suitable detection to initiate an appropriate control response.		P
7.5	Protection against supply interruption or voltage reduction and subsequent restoration: Where a supply interruption or a voltage reduction can cause a hazardous situation, damage to the machine, or to the work in progress, undervoltage protection is provided.		P
	Upon restoration of supply voltage, automatic or unexpected restarting of machine prevented.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Undervoltage protection does initiate appropriate control responses to ensure necessary coordination of groups of machines working together		P
7.6	Motor overspeed protection: Overspeed protection is provided where overspeeding can occur and could possibly cause a hazardous situation.		P
7.8	Phase sequence protection: Where an incorrect phase sequence of the supply voltage can cause a hazardous situation or damage to the machine, protection shall be provided.		P
7.9	Protection against overvoltage due to lightning and to switching surges: - Devices are connected to the incoming terminals of the supply disconnecting device.		P
8	EQUIPOTENTIAL BONDING		-
8.2	Protective bonding circuit		P
8.2.1	Where the conductance of structural parts of the electrical equipment or of the machine is less than that of the smallest protective conductor connected to the exposed conductive parts, a supplementary bonding conductor is provided.		P
	In IT distribution systems, the machine structure is part of the protective bonding circuit and insulation monitoring is provided.		P
	Exposed conductive parts of equipment in accordance with 6.3.2.3 (Protection by electrical separation) are not connected to the protective bonding circuit. (For this type of protection, the requirements of 413.5 of IEC 60364-4-41 apply.)		P
8.2.2	Protective conductors		
	Protective conductors shall be identified in accordance with 13.2.2.		P
	Copper conductors are preferred.		P
	Where other material is used, its electrical resistance per unit length shall not exceed that of the allowable copper conductor and such conductors shall be not less than 16 mm ² in cross-sectional area.	No other material used for conductor	N
	The cross-sectional area of protective conductors shall be determined in accordance with the requirements of: -543 of IEC 60364-5-54; or -7.4.3.1.7 of IEC 60439-1, as appropriate. This requirement is met in most cases if it is in accordance with Table 1 of this standard (see 5.2).		P

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Clause	Requirement - Test	Result - Remark	Verdict
8.2.3	Continuity of the protective bonding circuit		
	All exposed conductive parts are connected to the protective bonding circuit in accordance with 8.2.1. Parts that are mounted so that they do not constitute a hazard because cannot be touched on large surfaces or grasped with the hand and they are small in size (less than approximately 50 mm x 50 mm) or they are located so that either contact with live parts, or an insulation failure is unlikely need not be connected to the protective bonding circuit		P
	Where a part is removed the protective bonding circuit for the remaining parts isn't interrupted.		P
	Current-carrying capacity of connection and bonding points cannot be impaired by mechanical, chemical, or electrochemical influences (e.g. electrolytic corrosion on aluminium parts)		P
	Metal ducts of flexible or rigid construction and metallic cable sheaths are not used as protective conductors. Nevertheless they are connected to the protective bonding circuit.		P
	Where the electrical equipment is mounted on lids, doors, or cover plates, continuity of the protective bonding circuit shall be ensured. The use of a protective conductor (see 8.2.2) is recommended.		P
	For cables that are exposed to damage (for example flexible trailing cables) the continuity of the protective conductors are ensured by appropriate measures (for example monitoring).		P
8.2.4	No means of interruption of the protective bonding conductor are provided. <u>Exception:</u> links for test or measurement purposes that cannot be opened without the use of a tool and that are located in an enclosed electrical operating area.		P
	As well the protective bonding circuit does not incorporate a switching device or an over current protective device (for example switch, fuse).		P
	Removable current collectors, plug/socket combinations or withdrawable plug-in units: The protective bonding circuit is interrupted by a first make last break contact. (see also 13.4.5)		P
8.2.6	Protective conductor connecting points: have no other function and are not intended to attach or connect appliances or parts.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Each protective conductor connecting point is marked or labelled as such using the symbol IEC 60417-5019 or the letters PE or by use of bicolour GREEN / YELLOW		P
8.2.7	Mobile machines with on-board power supplies: The protective bonding system is connected to a single protective bonding terminal. This protective bonding terminal is the connection point for a possible additional external incoming power supply.		N
8.2.8	Electrical equipment having earth leakage currents higher than 10 mA a.c. or d.c.: Additional protective bonding requirements: - Cross section of protective conductor $\geq 10 \text{ mm}^2 \text{ CU}$ or $16 \text{ mm}^2 \text{ AL}$ - OR Second protective conductor of at least the same cross sectional area if above cross section is impracticable - OR monitoring of continuity of protective conductor with automatic disconnection function.		P
	Additionally a warning label is provided adjacent to the PE terminal.		P

9	CONTROL CIRCUITS AND CONTROL FUNCTIONS		
9.1.	Control circuit		P
9.1.1	Control circuit supply: Control transformers mandatory only when more than one motor starter or two control devices are used.		P
	Control transformers with separate windings are used for supplying the control circuits.		P
	Where several transformers are used, the secondary voltages are in phase.		P
	Separate windings on transformer for DC supplies connected to PE.		P
	Switch-mode units fitted with transformers in accordance with IEC 61558-2-17		P
9.1.2	The nominal voltage of control supply does not exceed 277 V when supplied from a transformer.		P
9.1.3	Control circuits are provided with overcurrent protection in accordance with 7.2.4 and 7.2.10.		P
9.2.	Control functions		P
	Safety related control functions in accordance with ISO 13849-1 (2006), ISO 13849-2 (2003) and /or IEC 62061 (see 9.4.1)		
9.2.1	Start functions operating by energizing the relevant circuit (see 9.2.5.2).		P

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Clause	Requirement - Test	Result - Remark	Verdict
9.2.3	Operating modes		
	Suitable means are prevented for unauthorized or inadvertent mode selection if hazardous situations can result.		P
	Mode selection by itself does not initiate machine operation. A separate actuation of the start control has to be stated by the operator.		P
	Indication of the selected operating mode is provided (e.g. the position of a mode selector, the provision of an indicating light, a visual display indication).		P
9.2.4	Where it is necessary to suspend safety functions and/or protective measures (for example for setting or maintenance purposes), protection is ensured.		P
9.2.5	Operation		
	Prevention of movement of the machine in an unintended or unexpected manner is taken after any stopping of the machine. (e.g. due to locked-off condition, power supply fault, battery replacement, lost signal condition with cableless control)		P
	When a machine has more than one control station, measures are provided to ensure that initiation of commands from different control stations do not lead to a hazardous situation.		P
9.2.5.2	Start of an operation is possible only when all of the relevant safety functions and/or protective measures are in place and are operational.		P
	Where safety functions and/or protective measures cannot be applied for certain operations, manual control of such operations are by hold-to-run controls, together with enabling devices, as appropriate.		P
	In the case of machines requiring the use of more than one control station to initiate a start, each of these control stations shall have a separate manually actuated start control device. The conditions to initiate a start are: - all required conditions for machine operation are met - and all start control devices are in the released (off) position - then all start control devices have to be actuated concurrently (see 3.6).		P
9.2.5.3	Stop category 0 and/or stop category 1 and/or stop category 2 stop functions are provided as indicated by the risk assessment and the functional requirements of the machine (see 4.1).		P
	Stop functions override related start functions		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Facilities to connect protective devices and interlocks are provided, where required. If such a protective device or interlock causes a stop of the machine, it may be necessary for that condition to be signalled to the logic of the control system. The reset of the stop function does not initiate any hazardous situation.		P
	Where more than one control station is provided, stop commands from any control station is effective when required by the risk assessment of the machine.		P
9.2.5.4	Emergency operations (emergency stop, emergency switching off)		
	Emergency stop or emergency switching off commands are sustained until it is reset.		P
	This reset is possible only by a manual action at that location where the command has been initiated.		P
	The reset of the command does not restart the machinery but only permit restarting.		P
	It is not be possible to restart the machinery until all emergency stop commands are reset.		P
	It is not be possible to reenergize the machinery until all emergency switching off commands are reset.		P
9.2.5.4.2	The emergency stop does function either as a stop category 0 or as a stop category 1.		P
	- it overrides all other functions and operations in all modes;		P
9.2.5.4.3	Emergency switching off is provided where: -Protection against direct contact is achieved only by placing out of reach or by obstacles (see 6.2.6) - or there is the possibility of other hazards or damage caused by electricity.		P
	Emergency switching off is accomplished by electromechanical switching devices, effecting a stop category 0 of machine actuators connected to this incoming supply.		P
9.2.5.5	Movement or action that can result in a hazardous situation are monitored by providing, for example, overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices.		P
9.2.6	Other control functions		
9.2.6.2	No type 1 two-hand control device is used for the initiation of hazardous operation. It need type 2 or type 3 two-hand control devices for such operations.		P

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Clause	Requirement - Test	Result - Remark	Verdict
9.2.6.3	Enabling control: Enabling control are arranged in the way to minimize the possibility of defeating, e. g. by requiring the de-activation of the enabling control device before machine operation may be reinitiated. It is not possible to defeat the enabling function by simple means.		P
9.2.6.4	Combined start and stop controls: Push-buttons etc. that alternately initiate and stop motion are provided only for functions, which cannot result in a hazardous situation.		P
9.2.7	Cableless control station		N
9.2.7.1	Means shall be provided to readily remove or disconnect the power supply of the operator control station (see also 9.2.7.3).		N
	Means (for example key operated switch, access code) are provided, as necessary, to prevent unauthorized use of the operator control station.		N
	Each operator control station carries an unambiguous indication of which machine(s) is (are) intended to be controlled by that operator control station.		N
9.2.7.2	Measures shall be taken to ensure that control commands: – affect only the intended machine; – affect only the intended functions.		N
	Measures are taken to prevent the machine from responding to signals other than those from the intended operator control station(s).		N
	Where necessary, means are provided so that the machine can only be controlled from operator control stations in one or more predetermined zones or locations.		N
9.2.7.3	Operator control stations include a separate and clearly identifiable means to initiate the stop function of the machine or of all the operations that can cause a hazardous situation. The actuating means to initiate this stop function are not marked or labelled as an emergency stop device, even though the stop function initiated on the machine can fulfil an emergency stop function.		N

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Clause	Requirement - Test	Result - Remark	Verdict
	Stopping of the machine and preventing a potentially hazardous operation is automatically initiated in the following situations: – when a stop signal is received; – when a fault is detected in the cableless control system; – when a valid signal (which includes a signal that communication is established and maintained) has not been detected within a specified period of time (see Annex B), except when a machine is executing a pre-programmed task taking it outside the range of the cableless control where no hazardous situation can occur.		N
9.2.7.4	Machines having more than one operator control station, including one or more cableless control stations, have measures provided to ensure that only one of the control stations can be enabled at a given time.		N
	An indication of which operator control station is in control of the machine is provided at suitable locations as determined by the risk assessment of the machine. Exception: a stop command from any one of the control stations are effective when required by the risk assessment of the machine.		N
9.2.7.5	Battery-powered cableless operator control stations: A variation in the battery voltage does not cause a hazardous situation.		N
	A clear warning is given to the operator when a variation in battery voltage exceeds specified limits.		N
	Under those circumstances, the cableless operator control station remains functional long enough for the operator to put the machine into a non- hazardous situation.		N
9.3	Protective interlocks		P
9.3.1	The reclosing or resetting of an interlocking safeguard does not initiate hazardous machine operation.		P
9.3.2	Where overtraveling an operating limit (for example speed, pressure, position) can lead to a hazardous situation, means are provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action.		P
9.3.3	The correct operation of auxiliary functions is checked by appropriate devices.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Appropriate interlocking is provided, when non-operation of an auxiliary function (for example lubrication, supply of coolant, swarf removal) can cause a hazardous situation, or cause damage to the machine or to the work in progress.		P
9.3.4	Interlocks between different operations and for contrary motions are provided if this operations lead to hazardous situations.		P
9.3.5	Reverse current braking: Where braking of a motor is accomplished by current reversal, measures prevent the motor starting in the opposite direction at the end of braking where that reversal can cause a hazardous situation or damage to the machine or to the work in progress.		P
	For this purpose, a device operating exclusively as a function of time is not permitted.		P
	Control circuits are arranged that rotation of a motor shaft, for example manually, does not result in a hazardous situation.		P
9.4	Control functions in the event of failure		P
9.4.1	The safety related electrical control circuits have an appropriate level of safety performance that has been determined from the risk assessment at the machine. The requirements of IEC 62061 and/or ISO 13849-1, ISO 13849-2 are met.		P
	Where memory retention is achieved for example, by battery power, measures are taken to prevent hazardous situations arising from failure or removal of the battery.		P
	Means are provided to prevent unauthorized or inadvertent memory alteration by, e.g. requiring the use of a key, access code or tool.		P
9.4.2	Measures are taken to minimize risk in the event of failure:		
9.4.2.1	- Use of proven circuit techniques and components		P
9.4.2.2	- Provisions of partial or complete redundancy		P
9.4.2.3	- Provision of diversity		P
9.4.2.4	- Provision for functional tests		P
9.4.3	Protection against mal-operation due to earth faults, voltage interruptions and loss of circuit continuity		
9.4.3.1	Earth faults on any control circuit don't cause unintentional starting, potentially hazardous motions, or prevent stopping of the machine. Methods to meet these requirements include but are not limited to the following:		
	a) 1) Control circuits, fed by control transformers and connected to the protective bonding circuit at the point of supply. (PELV) (see Figure 3 of this standard)		P

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Clause	Requirement - Test	Result - Remark	Verdict
	a) 2) Control circuits, fed by control transformers without connection to the protective bonding circuit at the point of supply in the arrangement according to figure 3 and having a device that interrupts the circuit automatically in the event of an earth fault		P
	b) Control circuits fed by a control transformer with a centre-tapped winding, this centre tap connected to the protective bonding circuit, arranged as shown in Figure 4 of this standard with the overcurrent protective device having switching elements in all control circuit supply conductors.		P
	c) Where the control circuit is not fed from a control transformer and is either: 1) directly connected between the phase conductors of an earthed supply, or; 2) directly connected between the phase conductors or between a phase conductor and a neutral conductor of a supply that is not earthed or is earthed through a high impedance, multipole switch that switch all live conductors are used for those functions that can cause hazardous situations or damage to the machine.		P
	Or in case of c) 2), a device is provided that interrupts the circuit automatically in the event of an earth fault.		P
9.4.3.2	For control systems using a memory device(s), proper functioning in the event of power failure is ensured (e.g. by using a non-volatile memory) to prevent any loss of memory that can result in a hazardous situation.		P
9.4.3.3	Upon sliding contacts the loss of continuity of safety-related control circuits depending on, can result in a hazardous situation. Appropriate measures are taken (for example by duplication of the sliding contacts).		P

10	OPERATOR INTERFACE AND MACHINE-MOUNTED CONTROL DEVICES		-
10.1.1	As far as is practicable, those devices are selected, mounted, and identified or coded in accordance with relevant parts of IEC 61310.		P
10.1.2	As far as is practicable, machine-mounted control devices are: – readily accessible for service and maintenance;		P
	– mounted in such a manner as to minimize the possibility of damage from activities such as material handling.		P
	The actuators of hand-operated control devices are selected and installed so that: – they are not less than 0,6 m above the servicing level and		P

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Clause	Requirement - Test	Result - Remark	Verdict
	– are within easy reach of the normal working position of the operator;		P
	– the operator is not placed in a hazardous situation when operating them.		P
	The actuators of foot-operated control devices are selected and installed so that: – they are within easy reach of the normal working position of the operator;		P
	– the operator is not placed in a hazardous situation when operating them.		P
10.1.3	The degree of protection (see IEC 60529) together with other appropriate measures does afford protection against:		P
	– the effects of aggressive liquids, vapours, or gases found in the physical environment or used on the machine;		P
	– the ingress of contaminants (for example swarf, dust, particulate matter).		P
	The operator interface control devices has a minimum degree of protection against direct contact of IPXXD (see IEC 60529).		P
10.1.4	Position sensors (for example position switches, proximity switches) are so arranged that they will not be damaged in the event of overtravel.		P
	Position sensors in circuits with safety-related control functions shall have direct opening action (see IEC 60947-5-1) or shall provide similar reliability (see 9.4.2).		P
10.1.5	Portable and pendant operator control stations and their control devices are so selected and arranged as to minimize the possibility of inadvertent machine operations caused by shocks and vibrations		P
10.2	Push-buttons		P
10.2.1	Mandatory: The colour RED is used only for emergency stop and emergency switching off actuators.		P
	The recommend colours of push-buttons are as shown in table 2 of this standard.		P
10.2.2	The recommend markings on push-buttons are as shown in table 3 of this standard.		P
10.3	Indicator lights and displays		-
10.3.1	Indicator lights and displays are selected and installed in such a manner as to be visible from the normal position of the operator (see also IEC 61310-1).		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Indicator light circuits used for warning lights are fitted with facilities to check the operability of these lights.		P
	The recommend colours on Indicator light are as shown in table 4 of this standard.		P
	Indicating towers on machines have the applicable colours in the following order from the top down; RED, YELLOW, BLUE, GREEN and WHITE.		P
	Where flashing lights or displays are used to provide higher priority information, audible warning devices should also be provided.		P
10.4	illuminated push-button actuators are colour-coded in accordance with Tables 2 and 4. Where there is difficulty in assigning an appropriate colour, WHITE is used.		P
	The colour RED for the emergency stop actuator shall not depend on the illumination of its light.		P
10.5	Devices having a rotational member, such as potentiometers and selector switches, have means of prevention of rotation of the stationary member. Friction alone isn't considered sufficient.		P
10.6	Actuators used to initiate a start function or the movement of machine elements (for example slides, spindles, carriers) are constructed and mounted so as to minimize inadvertent operation.		P
	However, mushroom-type actuators are used for two-hand control only. (see also ISO 13851).		P
10.7	Emergency stop devices		-
10.7.1	Devices for emergency stop are readily accessible.		P
	They are located at each operator control station and at other locations where the initiation of an emergency stop can be required (exception: see 9.2.7.3).		P
	In circumstances where confusion can occur between active and inactive emergency stop devices caused by disabling the operator control station, means (for example, information for use) are provided to minimise confusion.		P
10.7.2	Allowed types of device for emergency stop: – a push-button operated switch with a palm or mushroom head type; – a pull-cord operated switch; – a pedal-operated switch without mechanical guard.		P
	The devices are direct opening operation (see IEC 60947-5-1, Annex K).		P

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Clause	Requirement - Test	Result - Remark	Verdict
10.7.3	Actuators are coloured RED. If a background exists immediately around the actuator, then this background is coloured YELLOW. See also ISO 13850.		P
10.7.4	The supply disconnecting device may be locally operated to serve the function of emergency stop when: – it is readily accessible to the operator; and – it is of the type described in 5.3.2 a), b), c), or d). When also intended for this use, the supply disconnecting device meets the colours RED/YELLOW.		P
10.8	Emergency switing off device		P
10.8.1	Means are provided, where necessary, to avoid confusion between these devices.		P
10.8.2	The types of device for emergency switching off include: – a push-button operated switch with a palm or mushroom head type of actuator; – a pull-cord operated switch. The devices are direct opening action (see IEC 60947-5-1, Annex K). The push-button operated switch may be in a break-glass enclosure.		P
10.8.3	Actuators are coloured RED. If a background exists immediately around the actuator, then this background is coloured YELLOW. See also ISO 13850.		P
10.8.4	Where the supply disconnecting device is to be locally operated for emergency switching off, it is be readily accessible and meets the colours RED/YELLOW.		P
10.9	Enabling control device		P
	An enabling control device as a part of a system, does allow operation when actuated in one position only. In any other position, operation is stopped or prevented.		P
	Functions of two-position types: position 1: off-function of the switch (actuator is not operated); position 2: enabling function (actuator is operated)		P
	Functions of three-position types: position 1: off-function of the switch (actuator is not operated); position 2: enabling function (actuator is operated in its mid position); position 3: off-function (actuator is operated past its mid position); when returning from position 3 to position 2, the enabling function is not activated.		P

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Clause	Requirement - Test	Result - Remark	Verdict
11	CONTROLGEAR: LOCATION, MOUNTING AND ENCLOSURES		
11.2.1	All items of controlgear (inclusively terminals that are not part of controlgear components or devices) are placed and oriented so that they can be identified without moving them or the wiring.		P
	For items that require checking for correct operation or that are liable to need replacement, those actions should be possible without dismantling other equipment or parts of the machine (except opening doors or removing covers, barriers or obstacles).		P
	All controlgear are mounted so as to facilitate its operation and maintenance from the front.		P
	Necessary tools to adjust, maintain, or remove a device are supplied.		P
	Where access is required for regular maintenance or adjustment, the relevant devices shall be located between 0,4 m and 2,0 m above the servicing level.		P
	Terminals are least 0,2 m above the servicing level and so placed that conductors and cables can be easily connected to them.		P
	Only operating, indicating, measuring, and cooling devices are mounted on doors or on normally removable access covers of enclosures.		P
	Plug-in arrangements of control devices and plug-in-devices:		
	The connection is clearly identified by shape, marking or reference designation, singly or in combination.		P
	When they have to be handled during normal operation means are provided with non-interchangeable features where the lack of such a facility can result in malfunctioning.		P
	Plug/socket combinations that are handled during normal operation are unobstructedly accessible.		P
	Test points for connection of test equipment are: – unobstructedly accessible; – clearly identified to correspond with the documentation; – adequately insulated; – sufficiently spaced.		P
11.2.2	Non-electrical parts and devices, not directly associated with the electrical equipment, are not located within enclosures containing controlgear.		P
	Devices such as solenoid valves are separated from the other electrical equipment (for example in a separate compartment).		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Control devices mounted in the same location and connected to the supply voltage, or to both supply and control voltages, are grouped separately from those connected only to the control voltages.		P
	Terminals shall be separated into groups for: – power circuits; – associated control circuits; – other control circuits, fed from external sources (for example for interlocking).		P
	The clearances and creepage distances specified by the supplier are maintained, taking into account the external influences or conditions of the physical environment.		P
11.2.3	Heat generating components (for example heat sinks, power resistors) are located so, that the temperature of each component in the vicinity remains within the permitted limit.		P
	Controlgears are sufficiently protected against: - ingress of solid foreign objects - liquids - dust, coolants, and swarf, taking into account the external influences under which the machine is intended to operate (i.e. the location and the physical environmental conditions).		P
	Enclosures of controlgear provide a degree of protection of at least IP22 (see IEC 60529). <u>Exceptions:</u> a) specific electrical operating area b) When with removable collectors on conductor wire or conductor bar systems do not achieve IP22 measures of 6.2.5 are applied.		P
11.4	Enclosures, doors and openings		P
	Enclosures (inclusively screens of windows (windows: toughened glass or polycarbonate sheet of not less than 3 mm thickness), joints, gaskets of doors and lids) do withstand the foreseeable mechanical, electrical and thermal stresses and other environmental factors and of the aggressive liquids, vapours, or gases used on the machine.		P
	Fasteners used to secure doors and covers are of the captive type.		P
	Enclosure doors are not wider than 0,9 m and have vertical hinges, with an angle of opening > 95°.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	<p>Openings in enclosures (for example, for cable access), including those towards the floor or foundation or to other parts of the machine are equipped with means to ensure the degree of protection specified for the equipment.</p> <p>A suitable opening may be provided in the base of enclosures within the machine so that moisture due to condensation can drain away.</p>		P
	Openings for cable entries shall be easily re-opened on site.		P
	No openings between enclosures containing electrical equipment and compartments containing coolant, lubricating or hydraulic fluids, or those into which oil, other liquids, or dust can penetrate.		P
	Holes in an enclosure for mounting do not impair the required protection.		P
	<p>Equipment that, in normal or abnormal operation, can attain a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material is:</p> <ul style="list-style-type: none"> – located within an enclosure that will withstand, such temperatures; and – is located at a sufficient distance from adjacent equipment allowing safe dissipation of heat (see also 11.2.3); or – is otherwise screened by material that can withstand to the harmful effect. 		P
11.5	Access to control gear		N
	<p>Doors in gangways for access to electrical operating areas:</p> <ul style="list-style-type: none"> – are at least 0,7 m wide and 2,1 m high; – do open outwards; – have a means (for example panic bolts) to allow opening from the inside without the use of a key or tool. 		N
	Enclosures which readily allow a person to fully enter are be provided with means to allow escape, e.g. panic bolts on the inside of doors.		N
	<p>Enclosures intended for such access, for example for resetting, adjusting, maintenance, shall have a clear width of at least 0,7 m and a clear height of at least 2,1 m</p> <p>When equipment is likely to be live during access with > 1,0m and when on both side with > 1.5m.</p>		N
12	CONDUCTORS AND CABLES		P
	IMPORTANT: The following requirements do not apply to the integral wiring of assemblies, subassemblies, and devices that are manufactured and tested in accordance with their relevant IEC standard (for example IEC 60439-1).		

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Clause	Requirement - Test	Result - Remark	Verdict
12.2	In general, conductors are of copper. Where aluminium conductors are used, the cross-sectional area is at least 16 mm ² .		P
	The cross-sectional areas of conductors are according to Table 5 and its notes.		P
	All conductors that are often in movement (> one movement per hour of machine operation) have flexible stranding of class 5 or class 6.		P
	Where the insulation of conductors and cables (for example PVC) can constitute hazards due to the propagation of a fire or the emission of toxic or corrosive fumes adequate means are provided. Special attention is given to the integrity of a circuit having a safety-related function		P
	Minimum insulation test voltages for used cables are: – 2 000 V a.c. for a duration of 5 min for operation at voltages higher than 50 V a.c. or 120 V d.c., or – 500 V a.c. for a duration of 5 min for PELV		P
	Insulation strong enough to withstand damage due to operation or during laying, especially for cables pulled into ducts.		P
12.4	Current-carrying capacity in normal service in accordance with table 6. Or in accordance with suppliers recommendation.		P
12.6	Flexible cables		P
12.6.1	All flexible cables have Class 5 or Class 6 conductors.		P
	Cables under severe duties are adequately protected against: - abrasion due to mechanical handling and dragging across rough surfaces; - kinking due to operation without guides; - stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums.		P
12.6.2	The tensile stress applied to copper conductors does not exceed 15 N/mm ² of cross-sectional area. Or special measures are taken to withstand the applied stress. For material other than copper the applied stress is within the cable manufacturer's specification.		P
12.6.3	For cables installed on drums, the maximum current-carrying capacity in free air is derated in accordance with Table 7.		P

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Clause	Requirement - Test	Result - Remark	Verdict
12.7	Conductor wires, conductor bars and slip-ring assemblies		P
12.7.1	During normal access to the machine, protection against direct contact to conductor wires, conductor bars and slip-ring assemblies is achieved by the application of one of the following protective measures: – protection by partial insulation of live parts, or where this is not practicable; – protection by enclosures or barriers of at least IP2X.		P
	Horizontal top surfaces of barriers or enclosures that are readily accessible provide a degree of protection of at least IP4X.		P
	Where the required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching off in accordance with 9.2.5.4.3 is applied.		P
	Conductor wires and conductor bars are so placed / protected as to: – prevent contact with conductive items such as the cords of pull-cord switches, strain-relief devices and drive chains; – prevent damage from a swinging load.		P
12.7.2	Protective conductor circuit (PE) and the neutral conductor (N) each use a separate conductor wire, conductor bar or slip-ring.		P
	The continuity of the protective conductor circuit using sliding contacts is ensured by taking appropriate measures (for example, duplication of the current collector, continuity monitoring)		P
12.7.3	Protective conductor current collectors have a shape or construction so that they are not interchangeable with the other current collectors. Such current collectors shall be of the sliding contact type.		P
12.7.4	Removable current collectors (e.g. swiveling) with disconnecter function: The protective conductor circuit interrupts after and reconnects before any live conductor.		P
12.7.5	Clearances in air between conductors and adjacent systems are suitable at least a rated impulse voltage of an overvoltage category III in accordance with IEC 60664-1 (For example 4 kV for 230/400 V systems clearances 3mm)		P

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Clause	Requirement - Test	Result - Remark	Verdict
12.7.6	<p>Creepage distances between conductors and adjacent systems are suitable suitable for operation in the intended environment, e.g. open air (IEC 60664-1), inside buildings, protected by enclosures.</p> <p>In abnormally dusty, moist or corrosive environments, the following creepage distance requirements apply:</p> <ul style="list-style-type: none"> – unprotected conductor etc.: minimum creepage dist. of 60 mm – enclosed conductor etc.: minimum creepage distance of 30 mm 		P
12.7.7	Conductor system divided into isolated sections: suitable design measures are employed to prevent the energization of adjacent sections by the current collectors themselves.		P
12.7.8	<p>Construction of conductor wires etc.:</p> <ul style="list-style-type: none"> - power circuits are grouped separately from those in control circuits. - do withstand the foreseeable mechanical forces and thermal effects of short-circuit current. - covers can not be opened without the use of a tool - all conductive parts of accompanying enclosures are connected to the protective bonding circuit - underground and underfloor conductor bar ducts have drainage facilities 		P

13	WIRING PRACTICES		P
13.1	Connections and routing		P
13.1.1	All connections are secured against accidental loosening.		P
	The means of connection are suitable for the cross-sectional areas and nature of the conductors being terminated.		P
	No connection of two or more conductors to one terminal, unless the terminal is designed for it.		P
	No soldered connections to terminals unless they are suitable for it.		P
	Terminals on terminal blocks are plainly marked or labelled corresponding with the diagrams.		P
	Installations of flexible conduits and cables are such that liquids drain away from the fittings.		P
	Retaining means for conductor strand and shields provided (no soldering for that purpose)		P
	Identification tags legible, permanent, and appropriate for the physical environment.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	Terminal blocks mounted and wired so that the internal and external wiring does not cross over the terminals (see IEC 60947-7-1).		P
13.1.2	Conductors and cables run from terminal to terminal without splices or joints. Connections using plug/socket combinations with suitable protection against accidental disconnection are not considered to be joints for the purpose of this subclause.		P
	Terminations of cables are adequately supported to prevent mechanical stresses at the terminations of the conductors.		P
	Protective conductor placed close to the associated live conductors in order to decrease the impedance of the loop.		P
13.1.3	Conductors for circuits that operate at different voltages are separated by suitable barriers, or are insulated for the highest voltage that occurs within the same duct.		P
13.1	Connections and routing		P
13.2.1	Each conductor is identifiable at each termination in accordance with the technical documentation.		P
13.2.2	The protective conductor has the bicolour combination GREEN-AND-YELLOW Where the protective conductor can be easily identified colour coding throughout its length is not necessary, but the ends or accessible locations are clearly identified by the graphical symbol or by the bicolour combination GREEN-AND-YELLOW.		P
13.2.3	Neutral conductors are identified by the colour LIGHT BLUE. That colour is not used for identifying any other conductor where confusion is possible.		P
	Bare conductors used as neutral conductors have at minimum a stripe in LIGHT BLUE 15 mm to 100 mm wide in each compartment or unit and at each accessible location.		P
	Identification by colour for other conductors: Colours GREEN or YELLOW are not used. (Details to colour coding see this norm Cl. 13.2.3)		P
13.3	Wiring inside enclosures		P
	Conductors inside enclosures are supported where necessary. Conductors and cables that do not run in ducts are adequately supported.		P



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Clause	Requirement - Test	Result - Remark	Verdict
	Non-metallic supports are made with a flame-retardant insulating material (see IEC 60332 series)		P
	Connections to devices mounted on doors or to other movable parts are using flexible conductors in accordance with 12.2 and 12.6.		P
13.4	Wiring outside enclosures		P
13.4.2	<p>Conductors and their connections external to the electrical equipment are placed in suitable ducts (see cl.13.5).</p> <p>Exceptions:</p> <ul style="list-style-type: none"> - Cables with special suitable protection. - Position switches or proximity switches supplied with a dedicated cable which is sufficiently short. 		P
13.4.3	Connection to moving elements of the machine		N
	Connections to moving elements of the machine are made of flexible cable in accordance with 12.2 and 12.6.		N
	Bending radius of the cable are of at least 10 times the diameter of the cable		N
	Cables close to moving parts, maintain a space of at least 25 mm between the moving parts and the cables or barriers are provided.		N
	<p>Cable handling systems:</p> <p>Lateral cable angles do not exceeding 5°, at being wound on and off cable drums or approaching and leaving cable guidance devices. The bending radius is in accordance with table 8.</p>		N
	<p>Flexible conduit:</p> <ul style="list-style-type: none"> - is not used for connections to rapidly or frequently moving parts, except when specifically designed for that purpose. - is supported when adjacent to moving parts 		N
13.4.4	Interconnection of devices on the machine is made through adequate terminals.		P

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Clause	Requirement - Test	Result - Remark	Verdict
13.4.5	<p>Requirements to plug/socket combinations outside of enclosures: Exceptions: components connected to a bus system by a plug/socket combination</p> <p>a) Prevention for unintentional contact with live parts at any time. At least IPXXB. (PELV circuits are excepted from this requirement.)</p> <p>b) First make last break protective bonding contact if used in TN- or TT-systems.</p> <p>c) Sufficient load-breaking capacity, when intended to be disconnected under running conditions. When rated at ≥ 30 A interlocked with a switching device</p> <p>d) When rated at ≥ 16 A having a retaining means to prevent unintended or accidental disconnection.</p> <p>e) when unintended or accidental disconnection +can cause a hazardous situation, having a retaining means.</p> <p>f) Component remaining live after disconnection having at least IP2X or IPXXB, taking into account the required clearance and creepage distances.(PELV circuits are excepted from this requirement.)</p> <p>g) Metallic housings of plug/socket combinations being connected to the protective bonding circuit. (PELV circuits are excepted from this requirement.)</p> <p>h) Having retaining means to prevent unintended or accidental disconnection and being marked that they are not intended to be disconnected under load.</p> <p>i) Clearly identifiable if more then one plug / socket per device. It is recommended that mechanical coding being used.</p> <p>j) When used in control circuits fulfilling the applicable requirements of IEC 61984. Exception: see item k).</p> <p>k) No plug/socket combinations intended for household and similar general purposes 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.</p> <p>Exception: The requirements of item k) do not apply to control functions using high frequency signals on the power supply.</p>	No such construction	N
13.4.6	Protection of Plug / socket from the physical environment during transportation and storage.		P
13.5	Ducts, connection boxes and other boxes		P
	Provided with a degree of protection suitable for the application.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	No sharp edges, flash, burrs, rough surfaces, or threads with which the insulation of the conductors can come into contact.		P
	Where human passage is required, least 2 m above the working surface.		P
	Not used as connection for protective bonding circuit.		P
	Where cable trays are a.s.o. are only partially covered, the cables used are of a suitable type.		P
13.5.2	Filling the percentage of ducts adapted to the straightness and length of the duct and the flexibility of the conductors.		P
13.5.3	Rigid metal conduit and fittings shall galvanized steel or of a corrosion-resistant material		P
	Fittings compatible with the conduit.		P
	Conduit bends properly made		P
13.5.4	Flexible metal tubing or woven wire armour suitable for the expected physical environment.		P
13.5.5	Flexible non-metallic conduit resistant to kinking and suitable for the expected physical environment.		P
13.5.6	Requirements to cable trunking systems: - Rigidly supported and clear of all moving or contaminating portions of the machine - Covers overlapping the sides and attached.		P
13.5.7	The compartments of machine used as cable trunking systems are isolated from coolant or oil reservoirs and are entirely enclosed, and the conductors are secured.		P
13.5.8	Connection boxes and other boxes used for wiring: - Are accessible for maintenance. - Provide protection against the ingress of solid bodies and liquids, taking into account the external influences under which the machine is intended to operate (see 11.3). - Do not have unused knockouts etc.		P
13.5.9	Motor connection boxes: Encloses only connections to the motor and motor-mounted devices (e.g brakes, temperature sensors)		P
14	ELECTRIC MOTORS AND ASSOCIATED EQUIPMENT		P
14.1	Electric motors are conform to the relevant parts of IEC 60034 series.		P
	There protection is conform to the requirements given in 7.2 for overcurrent protection, in 7.3 for overload protection, and in 7.6 for overspeed protection.		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
	Motor control equipment is located and mounted in accordance with Clause 11.		P
14.2	Minimal IP23 protection for all motors. More stringent requirements depending on the application and the physical environment.		P
14.4	Motors incorporated as an integral part of the machine are adequately protected from mechanical damage.		P
	motors and its associated parts (inclusively motor connection box) are easily accessible for inspection and maintenance etc		P
	Cooling is ensured and the temperature rise remains within the limits of the insulation class (see IEC 60034-1)		P
	No opening between the motor compartment and any other compartment that does not meet the motor compartment requirements.		P
14.5	The characteristics of motors and associated equipment are selected in accordance with the anticipated service and physical environmental conditions (see 4.4). Detailed criteria see 14.5 of this norm.		P
14.6	Overload and overcurrent protective devices for mechanical brake actuators initiate simultaneously the deenergization (release) of the associated motors.		P
15	ACCESSORIES AND LIGHTING		P
15.1	Requirements for socket-outlets for accessory equipment: – conform to IEC 60309-1 (Where that is not practicable, they are clearly marked with voltage and current ratings); – continuity of the protective bonding circuit to the socket-outlet is ensured, except where protected by PELV; – unearthed conductors connected to the socket-outlet are overcurrent- and if required overload-protected – protection is separately from other circuits; – power supply to the socket-outlet is not disconnected by the supply disconnecting device for the machine or the section of the machine, the requirements of 5.3.5 apply.		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
15.2.1	<p>Requirements for local lighting of the machine and equipment:</p> <ul style="list-style-type: none"> - protective bonding circuit in accordance with 8.2.2. - ON/OFF switch incorporated in the lamp-holder or in the flexible connecting cords. - Stroboscopic effects avoided. - Where fixed lighting electromagnetic compatibility is taken into account. 		P
15.2.2	<p>Requirements to the power supply for local lighting:</p> <ul style="list-style-type: none"> – Nominal voltage not exceeding 250 V between conductors – isolating transformer connected to the load side of the supply with overcurrent protection in the secondary circuit; or – isolating transformer connected to the line side of the supply disconnecting device with overcurrent protection in the secondary circuit. That source is permitted for maintenance lighting circuits in control enclosures only; or – from a machine circuit with dedicated overcurrent protection; or – from an isolating transformer connected to the line side of the supply disconnecting device, provided with a dedicated primary disconnecting means and secondary overcurrent protection, and mounted within the control enclosure adjacent to the supply disconnecting device; or – from an externally supplied lighting circuit (for example factory lighting supply). This shall be permitted in control enclosures only, and for the machine work light(s) where their total power rating is not more than 3 kW. <p>Exception: Where fixed lighting is out of reach of operators during normal operations, the provisions of this subclause do not apply.</p>		P
15.2.3	<p>All unearthed conductors of circuits supplying lighting have their own overcurrent protecting devices.</p>		P
15.2.4	<p>Requirements to the fittings for local lighting:</p> <ul style="list-style-type: none"> – Adjustable lighting fittings are suitable for the physical environment. – lamp holders are in accordance with the relevant IEC standard; – lamp holders are constructed with an insulating material protecting the lamp cap – Reflectors are supported by a bracket and not by the lamp holder. <p>Exception: where fixed lighting is out of reach of operators during normal operation, the provisions of this subclause do not apply.</p>		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
16	MARKING, WARNING SIGNS AND REFERENCE DESIGNATIONS		
16.1	Warning signs, nameplates, markings, and identification plates are of sufficient durability to withstand the physical environment.		P
16.2.1	Enclosures that do not clearly show that they contain electrical equipment that has a risk of electric shock  are marked with the graphical symbol plainly visible on the enclosure door or cover. Exception: – enclosure equipped with a supply disconnecting device; – operator-machine interface or control station; – a single device with its own enclosure (for example position sensor).		P
16.2.2	Hazardous hot surfaces of the electrical equipment, are equipped with the graphical warning symbol 	No such construction	N
16.2.3	Control devices, visual indicators, and displays are clearly and durably marked to their functions.		P
16.2.4	Equipment (e.g. controlgear assemblies) is legibly and durably marked. A nameplate is attached to the enclosure adjacent to each incoming supply with: – name or trade mark of supplier; – certification mark, when required; – serial number, where applicable; – rated voltage, number of phases and frequency (if a.c.), – full-load current for each supply; – short-circuit rating of the equipment; – main document number (see IEC 62023).		P
16.2.5	All enclosures, assemblies, control devices, and components are plainly identified with the same reference designation as shown in the technical documentation.		P
17	TECHNICAL DOCUMENTATION		-
17.1	Documentation in agreed language provided.	Documentation in English	P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
17.2	<p>Information provided with the electrical equipment include:</p> <p>a) A main document (parts list or list of documents);</p> <p>b) Complementary documents including:</p> <ol style="list-style-type: none"> 1) a clear, comprehensive description of the equipment, installation and mounting, and the connection to the electrical supply(ies); 2) electrical supply(ies) requirements; 3) information on the physical environment (for example lighting, vibration, noise levels, atmospheric contaminants) where appropriate; 4) overview (block) diagram(s) where appropriate; 5) circuit diagram(s); 6) information (as applicable) on: <ul style="list-style-type: none"> • programming, as necessary for use of the equipment; • sequence of operation(s); • frequency of inspection; • frequency and method of functional testing; • guidance on the adjustment, maintenance, and repair, particularly of the protective devices and circuits; • recommended spare parts list; • list of tools supplied. 7) a description (including interconnection diagrams) of the safeguards, interlocking functions, and interlocking of guards against hazards, particularly for machines operating in a co-ordinated manner; 8) a description of the safeguarding and of the means provided where it is necessary to suspend the safeguarding (for example for setting or maintenance), (see 9.2.4); 9) instructions on the procedures for securing the machine for safe maintenance; (see also 17.8); 10) information on handling, transportation and storage; 11) information regarding load currents, peak starting currents and permitted voltage drops, as applicable; 12) information on the residual risks due to the protection measures adopted, indication of whether any particular training is required and specification of 		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
17.3	Unless otherwise agreed between manufacturer and user: – the documentation is in accordance with relevant parts of IEC 61082; – reference designations are in accordance with relevant parts of IEC 61346; – instructions / manuals are in accordance with IEC 62079. – parts lists where provided are in accordance with IEC 62027, class B.		P
17.4	Installation documents giving all information necessary for the preliminary work of setting up the machine (including commissioning) are provided. (In complex cases, it may be necessary to refer to the assembly drawings for details.)		P
	The recommended position, type, and cross-sectional areas of the supply cables to be installed on are clearly indicated.		P
	Data necessary for choosing the type, characteristics, rated currents, and setting of the overcurrent protective device for the supply conductors to the electrical equipment of the machine is stated (see 7.2.2).		P
	The size, purpose, and location of any ducts in the foundation that are to be provided by the user are detailed (see Annex B).		P
	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 are detailed (see Annex B).		P
	A diagram indicates where space is required for the removal or servicing of the electrical equipment.		P
	An interconnection diagram or table is provided, where it is appropriate. They give full information about all external connections.		P
	Where the electrical equipment is intended to be operated from more than one source of electrical supply, the interconnection diagram or table does indicate the modifications or interconnections required for the use of each supply.		P
17.5	Where it is necessary to facilitate the understanding of the principles of operation, an overview diagram is provided.		P
17.6	The circuit diagram shows the electrical circuits on the machine and its associated electrical equipment.		P
	Any graphical symbol not shown in IEC 60617-DB:2001 are separately described on the diagrams or supporting documents.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	The symbols and identification of components and devices are consistent throughout all documents and on the machine.		P
	Switch symbols on the electromechanical diagrams are shown with all supplies turned off (for example electricity, air, water, lubricant) and with the machine and its electrical equipment ready for a normal start.		P
	Conductors are identified in accordance with 13.2.		P
	Characteristics relating to the function of the control devices and components which are not evident from their symbolic representation are included on the diagrams adjacent to the symbol or referenced to a footnote.		P
17.7	An operating manual detailing proper procedures for set-up and use of the electrical equipment is provided.		P
	Particular attention is given to the safety measures.		P
	Where the operation of the equipment can be programmed, detailed information on methods of programming, equipment required, program verification, and additional safety procedures (where required) is given.		P
17.8	A maintenance manual detailing proper procedures for adjustment, servicing and preventive inspection, and repair is provided. Recommendations on maintenance/service intervals and records are part of that manual. Where methods for the verification of proper operation are provided (for example software testing programs), the use of those methods is detailed		P
17.9	The parts list, where provided, comprises, as a minimum, information necessary for ordering spare or replacement parts (for example components, devices, software, test equipment, technical documentation) required for preventive or corrective maintenance including those that are recommended to be carried in stock by the user of the equipment.		P
18	VERIFICATION		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict
18.1	<p>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):</p> <p>a) verification that the electrical equipment complies with its technical documentation; b) in case of protection against indirect contact by automatic disconnection, conditions for protection by automatic disconnection shall be verified according to 18.2; c) insulation resistance test (see 18.3); d) voltage test (see 18.4); e) protection against residual voltage (see 18.5); f) functional tests (see 18.6).</p>		
18.2	Verification of conditions for protection by automatic disconnection of supply		
18.2.2	Test 1: Verification of the continuity of the protective bonding circuit		
	<p>The resistance of each protective bonding circuit between the PE terminal and relevant points that are part of each protective bonding circuit is measured with a current between at least 0,2A.</p> <p>And the resistance measured is in the expected range according to the length, the cross sectional area and the material of the related protective bonding conductor.</p>		P
	Test 2: Fault loop impedance verification and suitability of the associated overcurrent protective device.		P
	The connections of the power supply and of the incoming external protective conductor to the PE terminal of the machine are verified by inspection.		P
	<p>The conditions for the protection by automatic disconnection of supply in accordance with 6.3.3 and Annex A a verified by both:</p> <p>1) A verification of the fault loop impedance by - calculation, or - measurement in accordance with A.4, and</p>		P
	2) A confirmation that the setting and characteristics of the associated overcurrent protective device are in accordance with the requirements of Annex A or table 10		P
18.3	<p>Insulation resistance tests (facultative)</p> <p>The insulation resistance measured at 500 V d.c. between the power circuit conductors and the protective bonding circuit are not less than 1 M Ω.</p>		P
18.4	<p>Voltage test (facultative)</p> <p>Testing voltage; twice the rated supply voltage of the equipment or 1 000 V whichever is the greater</p> <p>With test voltage applied between the power circuit conductors and the protective bonding circuit for a period of approximately 1 s. there is no disruptive discharge occurred.</p>		P

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Clause	Requirement - Test	Result - Remark	Verdict
18.5	Protection against residual voltages (facultative) Compliance with 6.2.4. is ensured		P
18.6	Functional tests The function of circuits for electrical safety (for example earth fault detection) is insured.		P

IEC 60204-1			
Clause	Requirement - Test	Result - Remark	Verdict

1. Continuity of the protective bonding circuit

Test Points	Test Result(m Ω)	Test Current(A)	Voltage Drop(V)
PE-Control Panel	68	10	0.68
PE-Electrical Box	58	10	0.58
PE-Motor1	65	10	0.65
Transformer1	68	10	0.68

2. Insulation Resistance

Test Points	Test Result(M Ω)
PE-Power Inlet	230
PE-Motor1	250
Transformer1	220

3. Withstanding Voltage

Test Points	Breakdown
PE-Power Inlet	No
PE-Motor1	No
Transformer1	No

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Clause	Requirement - Test	Result - Remark	Verdict

List of test equipment used:

(Note: This is an example of the required attachment. Other forms with a different layout but containing similar information are also acceptable.)

Clause	ID of test equipment	Measurement / testing	Testing / measuring equipment / material used	Range used	Calibration date
4.4	PT-2	Psychrometer- Thermograph	-10~50 C, 5% ~98 % R.H	10~50 C, 5% ~98% R.H	2017-09-20
4.3	JO-1	Oscilloscope	0~20KVac/ 0~16KVdc, 0 ~ 200MHz,0~200MS	0-500V	2017-09-20
7.4, 11.2.3	JT-4	Chart Recorder	0~1000 C	0-200 C	2017-09-20
17	TM-1	Tape-Measure	0~35 m	0-35m	2017-09-20
12.7.6	XS-1	Digital Caliper	0~200 mm	0-200mm	2017-09-20
18.4	DH-3	Withstanding Voltage Tester	0~5KV 0.3-100mA 50/60Hz	2000V ac	2017-09-20
8.2	DA-3	Leakage Current Meter	0-10mA, 0-150V / 0-500V	0-500V ac	2017-09-20
18.4	SW-2	Stop watch	0-99 h	0-99h	2017-09-20
18.3	INSU-01	Insulation resistance meter	0-500 M ohm	0-500 Mohm	2017-09-20
8.2	GRD-01	Earthing continuity meter	0-10 ohm	0-2 ohm	2017-09-20
7.4, 11.2.3	TH-1	Thermocouple	0-1000 C, type K	0-200 C	2017-09-20

- End of Main Report -

3.4 EN 60204-1:2018 Report

(ATTACHMENT TO TEST REPORT IEC 60204-1
European Group Differences and National Differences)

ATTACHMENT TO TEST REPORT IEC 60204-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES SAFETY OF MACHINERY - ELECTRICAL EQUIPMENT OF MACHINES PART 1: GENERAL REQUIREMENTS	
Differences according to.....:	EN 60204-1:2018
Attachment Form No.....:	EU_GD_IEC60204_1A
Attachment Originator	Electrosuisse
Master Attachment	2009-11
Copyright © 2009 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.	

	CENELEC COMMON MODIFICATIONS (EN)		
1.	Scope		
	– are sewing machines, units, and systems; NOTE 7 For sewing machines, see EN 60204-31. – are hoisting machines. NOTE 8 For hoisting machines, see EN 60204-32.		
3.	Terms and definitions		-
3.56	Uncontrolled stop NOTE This definition does not imply any particular state of other (for example, non-electrical) stopping devices, for example, mechanical or hydraulic brakes that are outside the scope of this standard.		-
4.2	Section of equipment		P
4.2.2	The electrical equipment of the machine shall satisfy the safety requirements identified by the risk assessment of the machine. Depending upon the machine, its intended use and its electrical equipment, the designer may select parts of the electrical equipment of the machine that are in compliance with EN 60439-1 and, as necessary, other relevant parts of the EN 60439 series (see also Annex F).		P
4.4	Physical environment and operating conditions		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.1	The electrical equipment shall be suitable for the physical environment and operating conditions of its intended use. The requirements of 4.4.2 to 4.4.8 cover the physical environment and operating conditions of the majority of machines covered by this part of EN 60204. When special conditions apply or the limits specified are exceeded, an agreement between user and supplier (see 4.1) is recommended (see Annex B).		P
4.4.3	Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. The minimum requirement for all electrical equipment is correct operation between air temperatures of +5 °C and +40 °C. For very hot environments (for example hot climates, steel mills, paper mills) and for cold environments, additional measures are recommended (see Annex B).		P
4.4.7	When equipment is subject to radiation (for example microwave, ultraviolet, lasers, X-rays), additional measures shall be taken to avoid malfunctioning of the equipment and accelerated deterioration of the insulation. A special agreement is recommended between the supplier and the user (see Annex B).	No radiation subjected.	N
4.4.8	Undesirable effects of vibration, shock and bump (including those generated by the machine and its associated equipment and those created by the physical environment) shall be avoided by the selection of suitable equipment, by mounting it away from the machine, or by provision of anti-vibration mountings. A special agreement is recommended between the supplier and the user (see Annex B).		P
5.	Incoming supply conductor terminations and devices for disconnecting and switching off		P
5.1	Add: See 17.8 for the provision of instructions for maintenance.		
5.4	NOTE 2 Further information on the location and actuation of devices such as those used for the prevention of unexpected start-up is provided in EN 60447. After the fifth paragraph, replace note 2 with: NOTE 3 The selection of a device should take into account, for example, information derived from the risk assessment, intended use and foreseeable misuse of the device. For example, the use of disconnectors, withdrawable fuse links		
9.	Control circuits and control functions		P

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Clause	Requirement + Test	Result - Remark	Verdict																												
9.2.6.3	Enabling control (see also 10.9) is a manually activated control function interlock that:																														
	a) when activated allows a machine operation to be initiated by a separate start control		N																												
	b) when de-activated – initiates a stop function in accordance with 9.2.5.3, and – prevents initiation of machine operation.		N																												
	Enabling control shall be so arranged as to minimize the possibility of defeating, for example by requiring the de-activation of the enabling control device before machine operation may be reinitiated. It should not be possible to defeat the enabling function by simple means.		N																												
9.2.7.3	Stop:																														
	Cableless control stations shall include a separate and clearly identifiable means to initiate the stop function of the machine or of all the operations that can cause a hazardous situation. The actuating means to initiate this stop function shall not be marked or labelled as an emergency stop device (see 10.7).		P																												
10.	Operator interface and machine-mounted control devices		P																												
	Replace table 2 with Table 2 – Colour coding for push-button actuators and their meanings		P																												
	<table border="1"> <thead> <tr> <th>Colour</th> <th>Meaning</th> <th>Explanation</th> <th>Examples of application</th> </tr> </thead> <tbody> <tr> <td>RED</td> <td>Emergency</td> <td>Actuate in the event of a hazardous situation or emergency</td> <td>Emergency stop Initiation of emergency function (see also 10.2.1)</td> </tr> <tr> <td>YELLOW</td> <td>Abnormal</td> <td>Actuate in the event of an abnormal condition</td> <td>Intervention to suppress abnormal condition Intervention to restart an interrupted automatic cycle</td> </tr> <tr> <td>BLUE</td> <td>Mandatory</td> <td>Actuate for a condition requiring mandatory action</td> <td>Reset function</td> </tr> <tr> <td>GREEN</td> <td>Normal</td> <td>Actuate to initiate normal conditions</td> <td>(See 10.2.1)</td> </tr> <tr> <td>WHITE</td> <td rowspan="3">No specific meaning assigned</td> <td rowspan="3">For general initiation of functions except for emergency stop</td> <td>START/ON (preferred) STOP/OFF</td> </tr> <tr> <td>GREY</td> <td>START/ON STOP/OFF</td> </tr> <tr> <td>BLACK</td> <td>START/ON STOP/OFF (preferred)</td> </tr> </tbody> </table>	Colour	Meaning	Explanation	Examples of application	RED	Emergency	Actuate in the event of a hazardous situation or emergency	Emergency stop Initiation of emergency function (see also 10.2.1)	YELLOW	Abnormal	Actuate in the event of an abnormal condition	Intervention to suppress abnormal condition Intervention to restart an interrupted automatic cycle	BLUE	Mandatory	Actuate for a condition requiring mandatory action	Reset function	GREEN	Normal	Actuate to initiate normal conditions	(See 10.2.1)	WHITE	No specific meaning assigned	For general initiation of functions except for emergency stop	START/ON (preferred) STOP/OFF	GREY	START/ON STOP/OFF	BLACK	START/ON STOP/OFF (preferred)		
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BLACK			START/ON STOP/OFF (preferred)																												
12.	Conductors and cables		P																												
12.7.8	Construction and installation of conductor wire, conductor bar systems and slip-ring assemblies																														
	The protective bonding circuit shall include the covers or cover plates of metal enclosures or underfloor ducts. Where metal hinges form a part of the bonding circuit, their continuity shall be verified (see Clause 18).		P																												

IEC60204_1A - ATTACHMENT

Clause	Requirement + Test	Result - Remark	Verdict
17.	Technical documentation		P
17.2	Information to be provided 3) information on the physical environment (for example lighting, vibration, atmospheric contaminants) where appropriate;		P
18.	Verification		P
18.1	General (5 th paragraph) For tests in accordance with 18.2 and 18.3, measuring equipment in accordance with the EN 61557 series is applicable. NOTE For other tests as required by this standard measuring equipment in accordance with relevant IEC or European Standards should be used.		P

ZA	ANNEX ZA, Normative references to IEC standards (normative)	P
	<p>Normative references to international publications with their corresponding European publications</p> <p>The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.</p> <p>NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.</p>	

ZZ	ANNEX ZZ, Essential requirements EC directives (informative)	P
	<p>Coverage of Essential Requirements of EC Directives</p> <p>This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers only the following essential requirements out of those given in Annex I of the EC Directive 98/37/EC:</p> <ul style="list-style-type: none"> – 1.1.2 – 1.2 – 1.5.1 – 1.5.4 – 1.6.3 (for isolation of electrical supplies of machinery) – 1.6.4 (for access to electrical equipment) – 1.7.0 – 1.7.1 – 1.7.2 (for residual risks of an electrical nature) – 1.7.4(c) <p>Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.</p> <p>WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.</p>	

IEC60204_1A - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

Clause	Requirement + Test	Result - Remark	Verdict
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-End of Attachment to Test Report IEC60204-1-

Annex: Technical Information

File No: MD-TCF-24-01-2-5

Applicant:

Zhejiang Baolong Machinery Company Limited

Address of applicant:

No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing

Zone, Ruian City, Zhejiang, China



A.1 Declaration of conformity with signature

A.2 Safety pictures of the machine

A.3 Instruction manual

Legal Person: _____

Product: Automatic Die-cutting Machine

Model:

BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050E
HT, BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH,
BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS



EC DECLARATION OF CONFORMITY

*Applicant
(Owner of Declaration)*

Zhejiang Baolong Machinery Company Limited
No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone,
Ruian City, Zhejiang, China

Manufacturer

Zhejiang Baolong Machinery Company Limited
No. 333 Mingxin Road, Feiyun Area, Ruian Economics Developing Zone,
Ruian City, Zhejiang, China

Trade Mark

BAOLONG

Product

Automatic Die-cutting Machine

Types / Models

BL-1050E, BL-1050S, BL-1050SS, BL-1050ET, BL-1050EH, BL-1050EHT,
BL-1050SH, BL-1050SHT, BL-1050ST, BL-1050FC, BL-1050FCH,
BL-1050FCTH, BL-1300FCT, BL-1300FCTH, BL-1650S, BL-1650SS

Serial Number

2023122501

Directive Applied

(2006/42/EC) MACHINERY DIRECTIVE (MD)
2014/35/EU Low Voltage Directive (LVD)

Related Standarts

EN ISO 12100: 2010
EN 60204-1:2018
EN 1010-1:2004+A1:2010
EN 1010-3:2002+A1:2009

We " ZHEJIANG BAOLONG MACHINERY COMPANY LIMITED" declare that our product mentioned above is in accordance with the (2006/42/EC) MACHINERY DIRECTIVE and 2014/35/EU Low Voltage Directive.

The person authorised to compile the technical file

Sign- Stamp
He Guang Yun

Name&Surname:

Title :

Manager

Date :

2023.12.25

Address :

Ruian, China



Annex 2: Safety pictures of the machine

Photo documentation

Type of equipment, model: Automatic Die-cutting Machine

Details of:

View:

general

front

rear

right

left

top

bottom



Details of:

View:

general

front

rear

right

left

top

bottom



Annex 2: Safety pictures of the machine

Details of:

View:

general

front

rear

right

left

top

bottom



Details of:

View:

general

front

rear

right

left

top

bottom



Annex 2: Safety pictures of the machine

Details of:

View:

- general
- front
- rear
- right
- left
- top
- bottom



Details of:

View:

- general
- front
- rear
- right
- left
- top
- bottom



Annex 2: Safety pictures of the machine

Details of:

View:

general

front

rear

right

left

top

bottom



Details of:

View:

general

front

rear

right

left

top

bottom



Annex 2: Safety pictures of the machine

Details of:

View:

general

front

rear

right

left

top

bottom



- End of Photo Documentation -