Technical Construction File

File No.： VC-CH-20230427

According to
2006/42/EC Machinery Directive

related to the
Automobile Spray Booth

Model:
GL-OB, GL1-CE, GL2-CE, GL3-CE, GL4-CE, GL5-CE, GL6-CE, GL7-CE, GL8-CE, GL9-CE, GL10-CE, GL1000-A1, GL-2000-A1, GL3000-A1, GL4000-A1, GL4000-A2, GL4000-A3, GL2000-B1, GL3000B1, GL3000-C1

its variants and modifications,
presented by

GZ GUANGLI EFE Co., Ltd.
Sidaxiang, Sanjing Village, Fuhe, Zhongxin Town, Zengcheng, Guangzhou City, Guangdong, China

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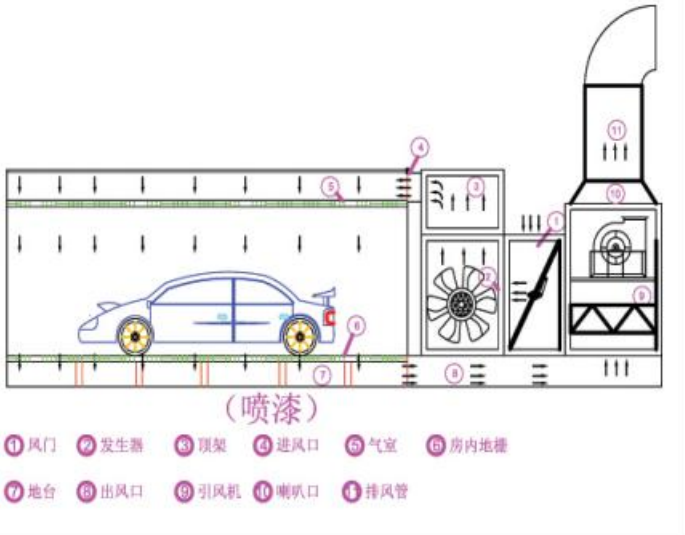
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Part I:General

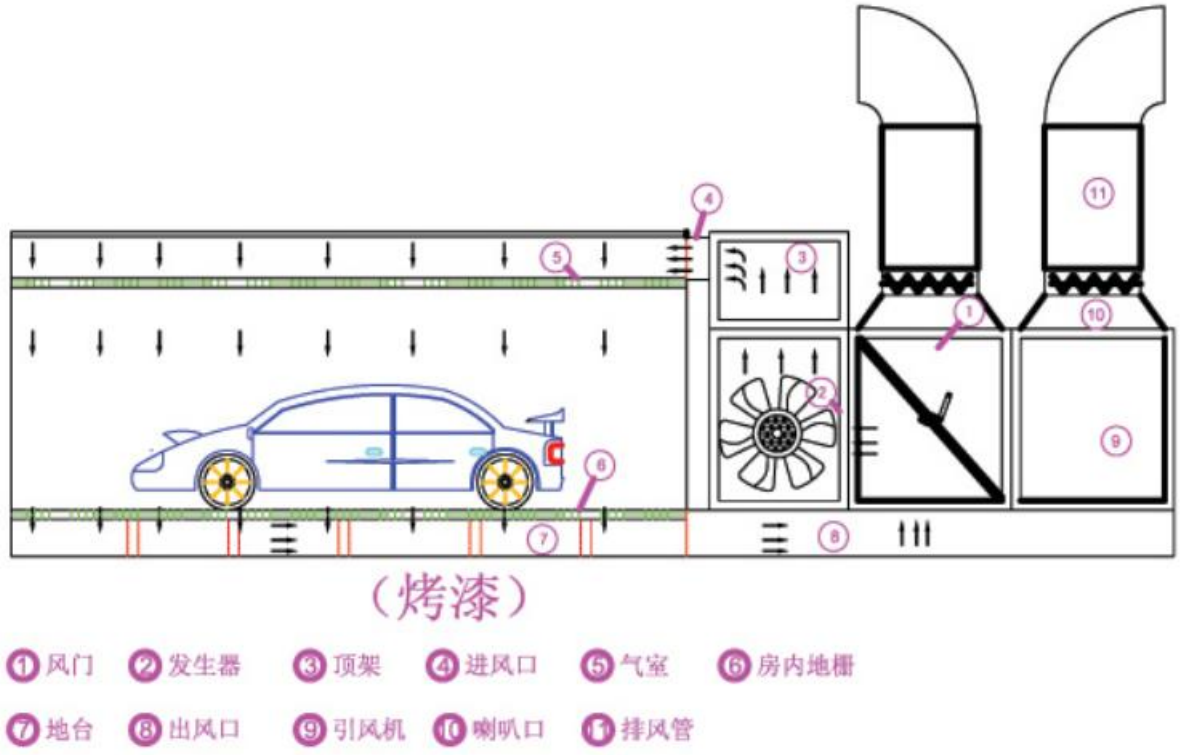
1.1 Generaldescription

Automobile Spray Booth is composed of room system, air supply system, purification system, heating system, lighting system, electric control system and other parts.

When painting, a main fan to start, fresh air from the air door inlet inhalation, first through the generator in the frame before the filter will be large particles of dust in the air filter, and then from the generator top frame, through the air inlet, was sent to the top of the baking room air chamber, air flow through the air chamber filter cotton filter clean from the top evenly downward flow, and then through the ground grille under the ground cotton filter clean, into the floor, from the air outlet into the induced draft fan The exhaust air is then pumped out via the exhaust duct. In order to speed up the filtration and discharge of the exhaust gases and to overcome the resistance of the system, a fan with extraction is installed at the outlet. Throughout the process, the positive pressure is always maintained in the baking room to prevent dust from entering outside the room. The sequence of the whole painting process: 1→2→3→4→5→6→7→8→9→10→11 is an external circulation working process inside and outside the room.



When baking , the selector switch will be played to the baking position, the circulating air door will be closed automatically, the cold air will stop being drawn in, the burner will start, the upper row of lights will be extinguished and the baking room will enter the inner cycle from the outer cycle working state. A main fan drives the air flow, the automatically controlled burner ignites and heats up, and the fresh clean air drawn into the room is heated by the heat exchanger. The hot air flow enters the air chamber from the top shelf through the air inlet, and after filtering through the filtering cotton in the air chamber, it enters the spray baking room. Finally the ground cotton filtered under the floor grille from the floor by the air outlet, again back to the circulation air door, the main fan drives the hot air through the heat exchanger most times for heating, so the cycle repeatedly temperature rising, when the temperature in the baking room reached the pre-set baking temperature will automatically maintain the temperature. Throughout the process, the baking room always maintains positive pressure to prevent dust from entering outside the room. The sequence of the whole baking process is: the air damper 1is closed→2→3→4→5→6→7→8→1→2. After the baking time is reached, it enters the cooling state; the burner stops heating and after 5 minutes of cooling time, the electric air door stops working and the fan automatically stops, the system returns to the standby state and the whole baking process is completed.



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 12100 for checking of general safety requirements of machinery;
- EN 60204-1 for checking of general electrical requirements of machinery

1.2 Variations of the series products

Regarding the whole family of the series, they can be divided into different groups according to their main features, they are:

Product specifications

No.	Model	Outside dimension (m)	Inside dimension (m)	Pressure fan power (kW)	Exhaust fan power (kW)	Heating system
1	GL-OB	7.0×5.4×3.5	6.9×3.9×2.7	5.5	--	Nanoplate
2	GL1-CE	8.1×4.0×3.2	6.9×3.9×2.7	5.5	--	--
3	GL2-CE	7.0×5.3×3.5	6.9×3.9×2.7	7.5	--	G20 Burner
4	GL3-CE	7.0×5.3×3.5	6.9×3.9×2.7	7.5	5.5	G20 Burner
5	GL4-CE	7.0×5.3×3.5	6.9×3.9×2.7	7.5	7.5	G20 Burner
6	GL5-CE	7.0×5.6×3.5	6.9×3.9×2.7	11	11	G20 Burner
7	GL6-CE	7.0×5.6×3.5	6.9×3.9×2.7	11	11	RG5S Burner
8	GL7-CE	7.0×5.6×4.0	6.9×3.9×2.7	11	11	RG5S Burner
9	GL8-CE	8.7×5.63×4.23	8.6×4.0×3.4	11	--	G20S Burner
10	GL9-CE	8.7×5.63×4.23	8.6×4.0×3.4	11	7.5	G20S Burner
11	GL10-CE	15.2×6.7×5.0	15.0×5.0×4.4	2×11	2×11	2×RG5S Burner
12	GL1000-A1	7.0×5.3×3.5	6.9×3.9×2.7	7.5	4	G20 Burner
13	GL2000-A1	7.0×5.6×3.5	6.9×3.9×2.7	7.5	5.5	G20 Burner
14	GL3000-A1	7.0×5.3×3.5	6.9×3.9×2.7	7.5	7.5	G20 Burner
15	GL4000-A1	7.0×5.6×3.5	6.9×3.9×2.7	11	11	G20 Burner
16	GL4000-A2	7.0×5.6×3.5	6.9×3.9×2.7	11	11	RG5S Burner
17	GL4000-A3	7.0×5.6×4.0	6.9×3.9×2.7	11	11	RG5S Burner
18	GL2000-B1	8.7×5.63×4.23	8.6×4.0×3.4	11	7.5	G20S Burner
19	GL3000-B1	8.7×5.63×4.23	8.6×4.0×3.4	11	11	G20S Burner
20	GL3000-C1	15.2×6.7×5.0	15.0×5.0×4.4	2×11	2×11	2×RG5S Burner

All these models are series products but with some small differences described as the above parameter specification table

To present the conformity of this series machine with Machinery Directive, we discuss the conformity systematically with the relative Directive and standards for **GL4-CE** as a basic evaluation in clause.

1.3 Quality control system

In order to ensure the conformity of the series production, GZ GUANGLI EFE CO., LTD. has taken the related procedures mentioned below：

Apply for the consultant form the qualified body in Shanghai viacert

GZ GUANGLI EFE CO., LTD. has applied for the certification form Shanghai viacert who is a competent institute for the CE marking certification in shanghai. The complete technical construction file (TCF) has been established before applying for the CE marking certificate under the certification of viacert.

Carry out the inspection for parts and components according to the TCF

Before the assemblies of the series production, the QC engineers of GZ GUANGLI EFE CO., LTD. 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.

Carry out the inspection & testing for the products before packing

Before packing the products, the QC engineers of FUSHENG GZ GUANGLI EFE CO., LTD. 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.

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.

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 GZ GUANGLI EFE CO., LTD. if the change may effects the related electrical or mechanical characteristics.

Provision for the Quality Assurance

For the provisions of internal control measures to ensure the conformity of series production of the machines, GZ GUANGLI EFE CO., LTD. has built an internal quality control system in accordance with the international standard.

1.4 Declaration of conformity

EC Declaration of Conformity

2006/42/EC Machinery Directive

This is hereby declared that following designated product complied with the essential health and safety requirements of above Council Directive(s) on the approximation of the laws of the Member States relating to it.

Product description:
Automobile Spray Booth

Model(s)/Type(s):
GL-OB,GL1-CE,GL2-CE,GL3-CE,GL4-CE,GL5-CE,GL6-CE,GL7-CE,GL8-CE,GL9-CE, GL10-CE,GL1000-A1,GL-2000-A1,GL30,00-A1,GL4000-A1,GL4000-A2,GL4000-A3,GL 2000-B1,GL3000B1,GL3000-C1

Standard(s):

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

EN 16985:2018 Spray booths for organic coating material - Safety requirements

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

This declaration is the responsibility of the Manufacturer:
GZ GUANGLI EFE Co., Ltd.
Sidaxiang,Sanjing Village,Fuhe,Zhongxin Town,Zengcheng, Guangzhou City, Guangdong, China

This declaration applies to all specimens manufactured identical to the model submitted for testing/ evaluation. Assessment of compliance of the product with the requirements relating to safety standards listed above was performed by manufacturer.

SIGNED ON BEHALF OF **GZ GUANGLI EFE Co., Ltd.**

SIGNATURE: _____

TITLE: **Manager**

PLACE: **Guangzhou**

DATE: **2023-03-03**

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1.5 List of applicable regulations andstandards

Regulations

- Machinery Directive: 2006/42/EC

Standards

- EN 60204-1:2018 Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- EN 16985:2018 Spray booths for organic coating material - Safety requirements
- EN ISO 12100:2010-Safety of machinery - General principles for design - Risk assessment and risk reduction

Part II： Assessment of conformity

2.1 Essential health and safety requirements

Article	Sub-article	Requirement	Fullfilment			Remark
			Y	N	N/	
1	1.1.2	**Principles of safety integration** (a) Machinery must be designed and constructed so that it is fitted forits function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof. The aim of measures taken must beto eliminate any risk throughout the foreseeable lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping. (b) In selecting the most appropriate methods, the manufacturer or his authorised representative must apply the following principles, in the order given: — eliminate or reduce risks as far as possible (inherently safe machinery design andconstruction), — take the necessary protective measures in relation to risks that cannot be eliminated, — inform users of the residual risks due to any shortcomings of the protective measures adopted, indicate whether any particular training is required and specify any need to provide personal protective equipment. (c) When designing and constructing machinery and whendrafting the instructions, the manufacturer or his authorised representative must envisage not only the intended use of the machinery but also any reasonably	☑			a-Inconsideration b- Inconsideration c- Warning hint mentioned in the user manual d-N/A No special personal protection equipment necessary e-N/A No special equipment or accessories necessary.

		attention to ways —which experience has shown might occur — in which the machinery should not be used. (d) Machinery must be designed and constructed to take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protective equipment. (e) Machinery must be supplied with all the special equipment and accessories essential to enable it to be adjusted, maintained and used safely.				
	1.1.3	**Materials and products** The materials used to construct machinery or products used or created during its use must not endanger persons' safety or health. In particular, where fluids are used, machinery must be designed and constructed to prevent risks due to filling, use, recovery or draining.	☑			No danger come from the materials or products.
	1.1.4	**Lighting** Machinery must be supplied with integral lighting suitable for the operations concerned where the absence thereof is likely to cause a risk despite ambient lighting of normal intensity. Machinery must be designed and constructed so that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects on moving parts due to the lighting. Internal parts requiring frequent inspection and adjustment, and maintenance areas must be provided with appropriate lighting.	☑			Enough illumination intensity

	1.1.5	**Design of machinery to facilitate its handling** Machinery, or each component part thereof, must: — be capable of being handled and transported safely, — be packaged or designed so that it can be stored safely and without damage. During the transportation of the machinery and/or its component parts, there must be no possibility of sudden movements or of hazards due to instability as long as the machinery and/or its component parts are handled in accordance with the instructions. 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: — either be fitted with attachments for lifting gear, or — be designed so that it can be fitted with such attachments, or — be shaped in such a way that standard lifting gear can easily be attached. Where machinery or one of its component parts is to be moved by hand, it must: — either be easily moveable, or — be equipped for picking up and moving safely. Special arrangements must be made for the handling of tools and/or machinery parts which, even if lightweight, could be hazardous.	☑			These requirements are complied with.
	1.1.6	**Ergonomics** Under the intended conditions of use, the discomfort, fatigue and physical and psychological stress faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as: — allowing for the variability of the operator's physical dimensions, strength and stamina,	☑			Ergonomical principles are considered during design

		— providing enough space for movements of the parts of the operator's body, — avoiding a machine-determined work rate, — avoiding monitoring that requires lengthy concentration, — adapting the man/machinery interface to the foreseeable characteristics of theoperators.				
	1.1.7	**Operating positions** The operating position must be designed and constructed in such a way as to avoid any risk due to exhaust gases and/or lack of oxygen. If the machinery is intended to be used in a hazardous environment presenting risks to the health and safety of the operator or if the machinery itself gives rise to a hazardous environment, adequate means must be provided to ensure that the operator has good working conditions and is protected against any foreseeable hazards. Where appropriate, the operating position must be fitted with an adequate cabin designed, constructed and/or equipped to fulfil the above requirements. The exit must allow rapid evacuation. Moreover, when applicable, an emergency exit must be provided in a direction which is different from the usual exit.	☑			The environment of operating positions are safe.
	1.1.8	**Seating** Where appropriate and where the working conditions so permit, work stations constituting an integral part of the machinery must be designed for the installation of seats. If the operator is intended to sit during operation and the operating position is an integral part of the machinery, the seat must be provided with the machinery.			☑	N/A

		The operator's seat must enable him to maintain a stable position. Furthermore, the seat and its distance from the control devices must be capable of being adapted to the operator. If the machinery is subject to vibrations, the seat must be designed and constructed in such a way as to reduce the vibrations transmitted to the operator to the lowest level that is reasonably possible. The seat mountings must withstand all stresses to which they can be subjected. Where there is no floor beneath the feet of the operator, footrests covered with a slip-resistant material must beprovided.				
	1.2 **1.2.1**	**Control Systems** **Safety and reliability of control systems** Control systems must be designed and constructed in such a way as to prevent hazardous situations from arising. Above all, they must be designed and constructed in such a waythat: — they can withstand the intended operating stresses and external influences, — a fault in the hardware or the software of the control system does not lead to Hazardous situations, — errors in the control system logic do not lead to hazardous situations, — reasonably foreseeable human error during operation does not lead to hazardous situations. Particular attention must be given to the following points: — the machinery must not start unexpectedly, — the parameters of the machinery must not change in an uncontrolled way, where such change may lead to hazardous situations,	☑			The control systems are designed reliably.

		— the machinery must not be prevented from stopping if the stop 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 protective devices must remain fully effective or give a stop command, — the safety-related parts of the control system must apply in a coherent way to the whole of an assembly of machinery and/or partly completed machinery. For cable-less control, an automatic stop must be activated when correct control signals are not received, including loss of communication.				
	1.2.2	**Control devices** Control devices mustbe: — clearly visible and identifiable, using pictograms where appropriate, — positioned in such a way as to be safely operated without hesitation or loss of time and without ambiguity, — designed in such a way that the movement of the control device is consistent with itseffect, — located outside the danger zones, except where necessary for certain control devices such as an emergency stop or a teach pendant, — positioned in such a way that their operation cannot cause additional risk, — designed or protected in such a way that the desired effect, where a hazard is involved, can only be achieved by a deliberate action, — made in such a way as to withstand foreseeable forces; particular attention	☑			Control devices are identified easily. The positions of control devices assembly are with no danger. Emergency stop devices have enough strength.

		must be paid to emergency stop devices liable to be subjected to considerable forces. Where a control device is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence, the action to be performed must be clearly displayed and subject to confirmation, where necessary. Control devices must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Machinery must be fitted with indicators as required for safe operation. The operator must be able to read them from the control position. From each control position, the operator must be able to ensure that no-one is in the danger zones, or the control system must be designed and constructed in such a way that starting is prevented while someone is in the danger zone. If neither of these possibilities is applicable, before the machinery starts, an acoustic and/or visual warning signal must be given. The exposed persons must have time to leave the danger zone or prevent the machinery starting up. If necessary, means must be provided to ensure that the machinery can be controlled only from control positions located in one or more predetermined zones or locations. Where there is more than one control position, the control system must be designed in such a way that the use of one of them precludes				

		When machinery has two or more operating positions, each position must be provided with all the required control devices without the operators hindering or putting each other into a hazardous situation.				
	1.2.3	**Starting** It must be possible to start machinery only by voluntary actuation of a control device provided for the purpose. The same requirement applies: — when restarting the machinery after a stoppage, whatever the cause, — when effecting a significant change in the operating conditions. However, the restarting of the machinery or a change in operating conditions may be effected by voluntary actuation of a device other than the control device provided for the purpose, on condition that this does not lead to a hazardous situation. For machinery functioning in automatic mode, the starting of the machinery, restarting after a stoppage, or a change in operating conditions may be possible without intervention, provided this does not lead to a hazardous situation. Where machinery has several starting control devices and the operators can therefore put each other in danger, additional devices must be fitted to rule out such risks. If safety requires that starting and/or stopping must be performed in a specific sequence, there must be devices which ensure that these operations are performed in the correct order.	☑			The requirements are complied with.

	1.2.4.1	**Stopping** Normal stopping Machinery must be fitted with a control device whereby the machinery can be brought safely to a complete stop. Each workstation must be fitted with a control device to stop some or all of the functions of the machinery, depending on the existing hazards, so that the machinery is rendered safe. The machinery's stop control must have priority over the start controls. Once the machinery or its hazardous functions have stopped, the energy supply to the actuators concerned must be cutoff.	☑			The normal stop control device is fitted and has priority over the start controls.
	1.2.4.2	**Operational stop** Where, for operational reasons, a stop control that does not cut off the energy supply to the actuators is required, the stop condition must be monitored and maintained.	☑			Have this kind of stop control and have this function.
	1.2.4.3	**Emergency stop** Machinery must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted. The following exceptions apply: — machinery in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken, — portable hand-held and/or hand-guided	☑			Emergency stop buttons arranged on the control box.

		— have clearly identifiable, clearly visible and quickly accessible control devices, — stop the hazardous process as quickly as possible, without creating additional risks, — where necessary, trigger or permit the triggering of certain safeguard movements. Once active operation of the emergency stop device has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting. The emergency stop function must be available and operational at all times, regardless of the operating mode. Emergency stop devices must be a back-up to other safeguarding measures and not a substitute for them.				
	1.2.4.4	**Assembly of machinery** In the case of machinery or parts of machinery designed to work together, the machinery must be designed and constructed in such a way that the stop controls, including the emergency stop devices, can stop not only the machinery itself but also all related equipment, if its continued operation may be dangerous.	☑			This requirement is satisfied.
	1.2.5	**Selection of control or operating modes** The control or operating mode selected must override all other control or operating modes, with the exception of the emergency stop. If machinery has been designed and constructed to allow its use in several	☑			The operating modes comply with these requirements.

		control or operating modes requiring different protective measures and/or work procedures, it must be fitted with a mode selector which can be locked in each position. Each position of the selector must be clearly identifiable and must correspond to a single operating or control mode. The selector may be replaced by another selection method which restricts the use of certain functions of the machinery to certain categories of operator. If, for certain operations, the machinery must be able to operate with a guard displaced or removed and/or a protective device disabled, the control or operating mode selector must simultaneously: — disable all other control or operating modes, — permit operation of hazardous functions only by control devices requiring sustainedaction, — permit the operation of hazardous functions only in reduced risk conditions while preventing hazards fromlinked sequences, — prevent any operation of hazardous functions by voluntary or involuntary action on the machine's sensors. If these four conditions cannot be fulfilled simultaneously, the control or operating mode selector must activate other protective measures designed and constructed to ensure a safe intervention zone. In addition, the operator must be able to control operation of the parts he is working on from the adjustment point.				
	1.2.6	**Failure of the powersupply** The interruption, the re-establishment after an interruption or the fluctuation in whatever manner of the power supply to the machinery must not lead to	☑			All therequirements are compliedwith.

		dangerous situations. Particular attention must be given to the following points: — the machinery must not start unexpectedly, — the parameters of the machinery must not change in an uncontrolled way when such change can lead to hazardous situations, — 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 protective devices must remain fully effective or give a stop command.				Interlock protection are provided at control box.
	1.3 **1.3.1**	**PROTECTION AGAINST MECHANICAL HAZARDS** **Risk Of Loss Of Stability** Machinery and its components and fittings must be stable enough to avoid overturning, falling or uncontrolled movements during transportation, assembly, dismantling and any other action involving the machinery. 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.	☑			The whole machinery and its components have enough stability. The foundation installation instruction refer to the manual book.
	1.3.2	**Risk of break-up during operation** The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used. The durability of the materials used must be adequate for the nature of the	☑			No this kind of risk. The parts of machinery and linkages have enough stability.

		working environment foreseen by the manufacturer or his authorised representative, in particular as regards the phenomena of fatigue, ageing, corrosion and abrasion. The instructions must indicate the type and frequency of inspections and maintenance required for safety reasons. They must, where appropriate, indicate the parts subject to wear and the criteria for replacement. Where a risk of rupture or disintegration remains despite the measures taken, the parts concerned must be mounted, positioned and/or guarded in such a way that any fragments will be contained, preventing hazardous situations. Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected to ensure that no risk is posed by a rupture. Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to persons: — when the workpiece comes into contact with the tool, the latter must have attained its normal working condition, — when the tool starts and/or stops (intentionally or accidentally), the feed movement and the tool movement must be coordinated.				The instructions have indicated all the necessary information. The water piping system can withstand the work pressure.
	1.3.3	**Risks due to falling or ejected objects** Precautions must be taken to prevent risks from falling or ejected objects	☑			The protective measures have been adopted.
	1.3.4	**Risks due to surfaces, edges or angles** 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.	☑			No such sharp edges or angles. No rough surface.

	1.3.5	**Risks related to combined machinery** 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. For this purpose, it must be possible to start and stop separately any elements that are not protected.			☑	It is not combined machinery.
	1.3.6	**Risks Related to Variations İn Operating Conditions** Where the machinery performs operations under different conditions of use, it must be designed and constructed in such a way that selection and adjustment of these conditions can be carried out safely and reliably.	☑			It is safe and reliable under different conditions.
	1.3.7	**Risks Related to Moving Parts** The moving parts of machinery must be designed and constructed in such a way as to prevent risks of contact which could lead to accidents or must, where risks persist, be fitted with guards or protective devices. All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work. In cases where, despite the precautions taken, a blockage is likely to occur, the necessary specific protective devices and tools must, when appropriate, be provided to enable the equipment to be safely unblocked.	☑			Moving parts are remote control. The necessary warning signs are provided.

		specific protective devices and how they are to be used.				
	1.3.8	**Choice of protection against risks related to moving parts** Guards or protective devices designed to protect against risks arising from moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help to make the choice.	☑			See Cl. 1.3.7
	1.3.8.1	**Moving Transmission Parts** Guards designed to protect persons against the hazards generated by moving transmission parts must be: — either fixed guards as referred to in section 1.4.2.1, or — interlocking movable guards as referred to in section 1.4.2.2. Interlocking movable guards should be used where frequent access is envisaged.	☑			See Cl. 1.3.7
	1.3.8.2	**Moving parts involved in the process** Guards or protective devices designed to protect persons against the hazards generated by moving parts involved in the process must be: — either fixed guards as referred to in section 1.4.2.1, or — interlocking movable guards as referred to in section 1.4.2.2, or — protective devices as referred to in section 1.4.3, or — a combination of the above. However, when certain moving parts directly involved in the process cannot be made completely inaccessible during operation owing to operations requiring operator intervention, such parts must be fitted with: — fixed guards or interlocking movable guards preventing access to those	☑			See Cl. 1.3.7

		sections of the parts that are not used in the work, and — adjustable guards as referred to in section 1.4.2.3 restricting access to those sections of the moving parts where access is necessary.				
	1.3.9	**Risks of uncontrolled movements** When a part of the machinery has been stopped, any drift away from the stopping position, for whatever reason other than action on the control devices, must be prevented or must be such that it does not present a hazard.	☑			Has been taken into account
	1.4 **1.4.1**	**Required characteristics of guards and protection devices General requirements** Guards and protective devices must: — be of robust construction, — be securely held in place, — not give rise to any additional hazard, — 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, and — enable essential work to be carried out on the installation and/or of tools and for maintenance purposes by restricting access exclusively to the area where the work has to be done, if possible without the guard having to be removed or the protective device having to be disabled. In addition, guards must, where possible, protect against the ejection or falling materials or objects and against emissions generated by the machinery.	☑			See CI. 1.3.7

	1.4.2 **1.4.2.1**	**Special requirements for** **guards Fixed guards** Fixed guards must be fixed by systems that can be opened or removed only with tools. Their fixing systems must remain attached to the guards or to the machinery when the guards are removed. Where possible, guards must be incapable of remaining in place without their fixings.	☑			See Cl. 1.3.7
	1.4.2 **1.4.2.2**	**Interlocking Movable Guards** Interlocking movable guards must: — as far as possible remain attached to the machinery when open, — be designed and constructed in such a way that they can be adjusted only by means of an intentional action. Interlocking movable guards must be associated with an interlocking device that: — prevents the start of hazardous machinery functions until they are closed and — gives a stop command whenever they are no longer closed. Where it is possible for an operator to reach the danger zone before the risk due to the hazardous machinery functions has ceased, movable guards must be associated with a guard locking device in addition to an interlocking device that: — prevents the start of hazardous machinery functions until the guard is closed and locked, and — keeps the guard closed and locked until the risk of injury from the hazardous machinery functions has ceased. Interlocking movable guards must be designed in such a way that the absence	☑			Interlocking movable guards are provided. Before the guards closed the machine can not be started.

	1.4.2 **1.4.2.3**	**Adjustable guards restricting access** Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must be: — adjustable manually or automatically, depending on the type of work involved, and — readily adjustable without the use of tools.	☑			This requirement is satisfied.
	1.4.3	**Special requirements for protection devices** Protective devices must be designed and incorporated into the control system in such a way that: — moving parts cannot start up while they are within the operator's reach, — persons cannot reach moving parts while the parts are moving, and — the absence or failure of one of their components prevents starting or stops the moving parts. Protective devices must be adjustable only by means of an intentional action.	☑			See Cl. 1.3.7
	1.5 **1.5.1**	**Risks due to other** **hazards Electricity** **supply** Where machinery has an electricity supply, it must be designed, constructed and equipped in such a way that all hazards of an electrical nature are or can be prevented. The safety objectives set out in Directive LVD 2006/95/EC shall apply to machinery. However, the obligations concerning conformity assessment and the placing on the market and/or putting into service of	☑			See the EN 60204-1 test report in detail.

	1.5.2	**Static electricity** Machinery must be designed and constructed to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system.	☑			See the EN 60204-1 test report in detail.
	1.5.3	**Energy supply other than electricity** Where machinery is powered by source of energy other than electricity, it must be so designed, constructed and equipped as to avoid all potential risks associated with such sources of energy.			☑	No other energy supply but electricity.
	1.5.4	**Errors of fitting** Errors likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design and construction of such parts or, failing this, by information given on the parts themselves and/or their housings. The same information must be given on moving parts and/or their housings where the direction of movement needs to be known in order to avoid a risk. Where necessary, the instructions must give further information on these risks. Where a faulty connection can be the source of risk, incorrect connections must be made impossible by design or, failing this, by information given on the elements to be connected and, where appropriate, on the means of connection.	☑			These requirements have been taken into account during design. All related information has been provided within the instruction manual. Necessary labels and markings have been provided.
	1.5.5	**Extreme temperatures** Steps must be taken to eliminate any risk of injury arising from contact with or	☑			All related operation steps have been provided within the user manual.

		proximity to machinery parts or materials at high or very low temperatures. The necessary steps must also be taken to avoid or protect against the risk of hot or very cold material being ejected.				
	1.5.6	**Fire** Machinery must be designed and constructed in such a way as to avoid any risk of fire or overheating posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.	☑			The design of the control is considered and comply the safety requirement.
	1.5.7	**Explosion** Machinery must be designed and constructed in such a way as to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery. Machinery must comply, as far as the risk of explosion due to its use in a potentially explosive atmosphere is concerned, with the provisions of the specific Community Directives. (ATEX)	☑			The design of the control is considered and comply the safety requirement. Allowable concentration of explosive gas has been monitored.
	1.5.8	**Noise** Machinery must be designed and constructed in such a way that risks resulting from the emission of airborne noise are reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source. The level of noise emission may be assessed with reference to comparative emission data for similar machinery.	☑			The noise degree is not high enough to endanger operators.

	1.5.9	**Vibrations** Machinery must be designed and constructed in such a way that risks resulting from vibrations produced by the machinery are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source. The level of vibration emission may be assessed with reference to comparative emission data for similar machinery.	☑			Have taken of measures to absorb vibration.
	1.5.10	**Radiation** Undesirable radiation emissions from the machinery must be eliminated or be reduced to levels that do not have adverse effects on persons. Any functional ionising radiation emissions must be limited to the lowest level which is sufficient for the proper functioning of the machinery during setting, operation and cleaning. Where a risk exists, the necessary protective measures must be taken. Any functional non-ionising radiation emissions during setting, operation and cleaning must be limited to levels that do not have adverse effects on persons.			☑	Risk due to radiation is not considered.
	1.5.11	**External radiation** Machinery must be so designed and constructed that external radiation does not interfere with its operation.			☑	Risk due to external radiation is not Considered
	1.5.12	**Laser radiation** Where laser equipment is used, the following should be taken into account: — laser equipment on machinery must be designed and constructed in such a			☑	No laser equipment

		way as to prevent any accidental radiation, — laser equipment on machinery must be protected in such a way that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health, — optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by laser radiation.				
	1.5.13	**Emissions of Hazardous Materials and Substances** Machinery must be designed and constructed in such a way that risks of inhalation, ingestion, contact with the skin, eyes and mucous membranes and penetration through the skin of hazardous materials and substances which it produces can be avoided. Where a hazard cannot be eliminated, the machinery must be so equipped that hazardous materials and substances can be contained, evacuated, precipitated by water spraying, filtered or treated by another equally effective method. Where the process is not totally enclosed during normal operation of the machinery, the devices for containment and/or evacuation must be situated in such a way as to have the maximum effect.			☑	No such risk considered
	1.5.14	**Risk of being trapped in a machine** Machinery must be designed, constructed or fitted with a means of preventing a person from being enclosed within it or, if that is impossible, with a means of summoning help.	☑			Can be open the door easily.

	1.5.15	**Risk of slipping, tripping or falling** Parts of the machinery where persons are liable to move about or stand must be designed and constructed in such a way as to prevent persons slipping, tripping or falling on or off these parts. Where appropriate, these parts must be fitted with handholds that are fixed relative to the user and thatenable them to maintain their stability.	☑			Has been taken into account
	1.5.16.	**Lightning** Machinery in need of protection against the effects of lightning while being used must be fitted with a system for conducting the resultant electrical charge to earth.	☑			The machines may be placed outdoor. Prevent lightning devices are fixed
	1.6 **1.6.1**	**Maintenance** **Machinery** Adjustment and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair,cleaning and servicing operations while machinery is at a standstill. If one or more of the above conditions cannot be satisfied for technical reasons, measures must be taken to ensure that these operations can be carried out safely (see section 1.2.5).In the case of automated machinery and, where necessary, other machinery, a connecting device for mounting diagnostic fault-finding equipment must be provided. Automated machinery components which have to be frequently must be capable of being removed and replaced easily and safely. Access to the components must enable these tasks to be carried out with the necessary technical means in accordance with a specified operating method.	☑			Refer to the manual book. The routine inspectionshould be taken out by professional staffs.

	1.6.2	**Access to operating position and servicing points** Machinery must be designed and constructed in such a way as to allow access in safety to all areas where intervention is necessary during operation, adjustment and maintenance of the machinery.			☑	No special means for person access needed
	1.6.3	**Isolation of energy sources** Machinery must be fitted with means to isolate it from all energy sources. Such isolators must be clearly identified. They must be capable of being locked if reconnection could endanger persons. Isolators must also be capable of being locked where an operator is unable, from any of the points to which he has access, to check that the energy is still cutoff. In the case of machinery capable of being plugged into an electricity supply, removal of the plug is sufficient, provided that the operator can check from any of the points to which he has access that the plug remains removed. After the energy is cut off, it must be possible to dissipate normally any energy remaining or stored in the circuits of the machinery without risk to persons. As an exception to the requirement laid down in the previous paragraphs, certain circuits may remain connected to their energy sources in order, for example, to hold parts, to protect information, to light interiors, etc. In this case, special steps must be taken to ensure operator safety.	☑			The power switches have been used. It has a clear identification. The isolator can be lockedin the offposition. All the parts will not be live after the energy is cut off.
	1.6.4	**Operator intervention** Machinery must be so designed, constructed and equipped that the need for operator interventionis limited.	☑			The operator intervention is easy and safe work.

		If operator intervention cannot be avoided, it must be possible to carry it out easily and safely.				
	1.6.5	**Cleaning of internal parts** The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is impossible to avoid entering the machinery, it must be designed and constructed in such a way as to allow cleaning to take place safely.	☑			Cleaning of internal parts is convenient and safe.
	1.7 **1.7.1**	**Information** **Information and Warnings on The Machinery** Information and warnings on the machinery should preferably be provided in the form of readily understandable symbols or pictograms. Any written or verbal information and warnings must be expressed in an official Community language or languages, which may be determined in accordance with the Treaty by the Member State in which the machinery is placed on the market and/or put into service and may be accompanied, on request, by versions in any other official Community language or languages understood by the operators.	☑			The warning label is preferably provided
	1.7.1.1	**Information and Information Devices** The information needed to control machinery must be provided in a form that is unambiguous and easily understood. It must not be excessive to the extent of overloading the operator.			☑	No information device.

		Visual display units or any other interactive means of communication between the operator and the machine must be easily understood and easy to use.				
	1.7.1.2	**Warning devices** Where the health and safety of persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped in such a way as to give an appropriate acoustic or light signal as a warning. Where machinery is equipped with warning devices these must be unambiguous and easily perceived. The operator must have facilities to check the operation of such warning devices at all times. The requirements of the specific Community Directives concerning colours and safety signals must be complied with.	☑			Acoustic and light signals warning device is arranged in control panel.
	1.7.2	**Warning of residual risks** Where risks remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted, the necessary warnings, including warning devices, must be provided.	☑			Warning hint available in user manual.
	1.7.3	**Marking of machinery** All machinery must be marked visibly, legibly and indelibly with the following minimum particulars: — the business name and full address of the manufacturer and, where applicable, his authorized representative, — designation of the machinery, — the CE Marking (see Annex III), — designation of series or type,	☑			Label by aluminum plate on the machine includes: - name and address of the manufacturer; - CE marking - Type designation - Power supply - Series number

		— serial number, if any, — the year of construction, that is the year in which the manufacturing process is completed. It is prohibited to pre-date or post-date the machinery when affixing the CE marking. Furthermore, machinery designed and constructed for use in a potentially explosive atmosphere must be marked accordingly. Machinery must also bear full information relevant to its type and essential for safe use. Such information is subject to the requirements set out in section 1.7.1. Where a machine part must be handled during use with lifting equipment, its mass must be indicated legibly, indelibly and				- Manufacturing date - Total weight - Outside size Other information refer to annex and user manual.
	1.7.4	**Instructions** All machinery must be accompanied by instructions in the official Community language or languages of the Member State in which it is placed on the market and/or put into service. The instructions accompanying the machinery must be either 'Original instructions' or a 'Translation of the original instructions', in which case the translation must be accompanied by the original instructions.9.6.2006 EN Official Journal of the European Union L 157/47 By way of exception, the maintenance instructions intended for use by specialised personnel mandated by the manufacturer or his authorised representative may be supplied in only one Community language which the specialised personnel understand. The instructions must be drafted in accordance with the principles set out below.	☑			User manual is sufficient.
	1.7.4.1	**General Principles For The Drafting Of Instructions** (a) The instructions must be drafted in one or more official Community	☑			User manual is sufficient.

		languages. The words 'Original instructions' must appear on the language version(s) verified by the manufacturer or his authorised representative. (b) Where no 'Original instructions' exist in the official language(s) of the country where the machinery is to be used, a translation into that/those language(s) must be provided by the manufacturer or his authorised representative or by the person bringing the machinery into the language area in question. The translations must bear the words 'Translation of the original instructions'. (c) The contents of the instructions must cover not only the intended use of the machinery but also take into account any reasonably foreseeable misuse thereof. (d) In the case of machinery intended for use by non-professional operators, the wording and layout of the instructions for use must take into account the				
	1.7.4.2	**Contents of the instructions** Each instruction manual must contain, where applicable, at least the following information: (a) the business name and full address of the manufacturer and of his authorised representative; (b) the designation of the machinery as marked on the machinery itself, except for the serial number (see section 1.7.3); (c) the EC declaration of conformity, or a document setting out the contents of the EC declaration of conformity, showing the particulars of the machinery, not necessarily including the serial number and the signature; (d) a general description of the machinery;	☑			See User Manual. A detailed user manual is prepared.

		(e) the drawings, diagrams, descriptions and explanations necessary for the use, maintenance and repair of the machinery and for checking its correct functioning; (f) a description of the workstation(s) likely to be occupied by operators; (g) a description of the intended use of the machinery; (h) warnings concerning ways in which the machinery must not be used that experience has shown might occur; (i) assembly, installation and connection instructions, including drawings, diagrams and the means of attachment and the designation of the chassis or installation on which the machinery is to be mounted; (j) instructions relating to installation and assembly for reducing noise or vibration; (k) instructions for the putting into service and use of the machinery and, if necessary, instructions for the training of operators; (l) information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted; (m) instructions on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided; (n) the essential characteristics of tools which may be fitted to the machinery; (o) the conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns; (p) instructions with a view to ensuring that transport, handling and				

		various parts where these are regularly to be transported separately; (q) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked; (r) the description of the adjustment and maintenance operations that should be carried out by the user and the preventive maintenance measures that should be observed; (s) instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations; (t) the specifications of the spare parts to be used, when these affect the health and safety of operators; (u) the following information on airborne noise emissions: — the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact must be indicated, — the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa), — the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A). These values must be either those actually measured for the machinery in question or those established on the basis of measurements taken for technically comparable machinery which is representative of the machinery to be produced. In the case of very large machinery, instead of the A-weighted sound power level, the A-weighted emission				

		sound pressure levels at specified positions around the machinery may be indicated. Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery. Whenever sound emission values are indicated the uncertainties surrounding these values must be specified. The operating conditions of the machinery during measurement and the measuring methods used must be described. Where the workstation(s) are undefined or cannot be defined, A-weighted sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1,6 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated. Where specific Community Directives lay down other requirements for the measurement of sound pressure levels or sound power levels, those Directives must be applied and the corresponding provisions of this section shall not apply; (v) where machinery is likely to emit non-ionising radiation which may cause harm to persons, in particular persons with active or non-active implantable medical devices, information concerning the radiation emitted for the operator and exposed persons.				
	1.7.4.3	**Sales Literature** Sales literature describing the machinery must not contradict the instructions as regards health and safety aspects. Sales literature describing the performance characteristics of machinery must contain the same information on emissions as is contained in the instructions.	☑			Refer to instruction manual.

Internal Production Control				
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.	☑			TCF would be saved 10 years after last product been manufactured.
Safety measures for fulfilling the product conformity requirements - Critical components shall be checked for every purchasing order if it is complied 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	☑			See records and reports.

2.2 Risk assessment

Risk Assessment Strategy

To implement risk assessment and risk reduction the designer shall take the following actions, in the order given (see Figure 1):

a) determine the limits of the machinery, which include the intended use and any reasonably foreseeable misuse there of;

b) identify the hazards and associated hazardous situations;

c) estimate the risk for each identified hazard and hazardous situation;

d) evaluate the risk and take decisions about the need for risk reduction;

The final step is related to risk reduction.

e) eliminate the hazard or reduce the risk associated with the hazard by means of protective measures.

Follow the above steps to analyse the risks associated with machinery.

Risk assessment is always followed where possible risk reduction and iteration of the process can be required to eliminate hazards as far as practicable and to implement protective measures to reduce risks.

Protective Measures

Protective measures are the measures implemented by the designer and the user, protective measures designed into the product are generally more effective and tend to be cheaper to implement.

The objective is to achieve the most practicable risk reduction taking into account the following:

a) Safety of the machine in all the phases of the lifecycle

b) Ability of the machine to perform its function

c) The usability of the machine

d) The manufacturing, operational and dismantling cost of the machine

Risk reduction

Following a risk assessment risk reduction may be required. This can be achieved by the elimination of the hazard or by separately or simultaneously reducing each of the elements that determine the associated risk.

a) Severity of harm from the hazard,

b) Probability of the occurrence of thatharm.

All protective measures that are intended to meet this objective shall be applied using the " Three Step Method".

Step 1: Inherently safe designmeasures

Inherently safe design measures eliminate hazards or reduce the associated risks by a suitable choice of design features of the machine itself and/or interaction between the exposed persons and the machine.

NOTE 1: This stage is the only one at which hazards can be eliminated, thus avoiding the need for additional protective measures such as safeguarding or complementary protective measures.

Step 2: Safeguarding and/or complementary protective emeasures

Taking into account the intended use and the reasonably foreseeable misuse, appropriately selected safeguarding and complementary protective measures can be used to reduce risk when it is not practicable to eliminate a hazard, or reduce its associated risk sufficiently, using inherently safe design measures.

Step 3: Information foruse

Where risks remain despite inherently safe design measures, safeguarding and the adoption of complementary protective measures, the residual risks shall be identified in the information for use. The information for use shall include, but not be limited to, the following:

Operating procedures for the use of the machinery consistent with the expected ability of personnel who use the machinery or other persons who can be exposed to the hazards associated with the machinery.

The recommended safe working practices for the use of the machinery and the related training requirements adequately

described. Sufficient information, including warning of residual risks for the different phases of the life of the machinery.

The description of any recommended personal protective equipment, including detail as to its need as well as to training needed for its use.

Information for use shall not be a substitute for the correct application of inherently safe design measures, safeguarding or complementary protective measures.

NOTE 2: Adequate protective measures associated with each of the operating modes and intervention procedures reduce the possibility of operators being induced to use hazardous intervention techniques in case of technical difficulties.

Prior to beginning work the first time, the operators are expected to have read and understood the safety section of the instructions that accompany the machinery, and to be familiar with the location and operation of each control, and to have received appropriate training / competence assessment.

Risk Estimation

Hazards should be assessed at all phases of the machine life i.e. construction, transportation, assembly, installation, commissioning, use, maintenance, dismantling & disposal.

Risk is a function of the combination of the **severity of harm** and the **probability of occurrence** of that harm. Information taken from the determined limits of the machinery will allow the risk assessor to correctly estimate the risks.

The severity of harm is estimated by considering the *severity of injury* or damage to health and the *extent of the harm*. The probability of occurrence is itself a function of the *exposure of person* (s) to the hazard, the *occurrence of a hazardous event* and the *possibility to avoid* or limit the harm.

Severity of Harm

When completing risk assessments, the risk from the most likely severity of harm that is likely to occur from each identified hazard shall be considered and the highest foreseeable severity shall also be taken into account, even if the probability is low.

The **severity of harm** can be distinguished in better detail by considering the **severity of injury** and the **extent of that harm**.

Probability of Occurrence of that harm

This is a combination of factors that can be split into the **Frequency of Exposure** and **Possibility of Avoidance**.

The frequency of exposure takes into account the *frequency of access, the nature of access, the number of persons* requiring access to the hazard zone and the *time spend within the hazard zone*. Also there are other element to identification of possibility of avoidance which considers the machines history (reliability / known problems) and the type of machine by using comparison of risks to similar machines.

The possibility of avoidance considers the skill of the operators / persons exposed to the harm, how quickly the hazardous situation develops and how easy it is for the operator / persons exposed to the harm to identify a risk.

The risk score is calculated by multiplying: severity of injury x extent of harm, frequency of exposure x possibility of avoidance using the following scoring system:

	Rating	Description	Score
Severity of Injury	High	irreversible e.g. loss of limb, or fatality	3
	Medium	recoverable e.g. broken bone or deep cuts	2
SOI	Low	reversible, minor cuts and bruises	1

Extent of Harm *EOH*	Several	Multiple persons exposed to hazard	2
	One	Single person exposed to hazardous situation	1
Frequency of Exposure	High	frequent e.g. more than once every 10 minutes	3
	Medium	regularly e.g. once per hour	2
	Low	infrequent e.g. once per week	1
Possibility of Avoidance	High	obvious and slow moving	1
	Medium	can get out of the way with normal reactions	2
	Low	hazard not obvious and moving fast	3

Note: The scoring for Possibility of Avoidance is reversed from the other 2 categories.

For each hazard the objective is to get to a risk score of 4 or less.

Once the risk has been assessed, appropriate elimination and reduction measures should be taken and the risk rating recalculated.
Risk reduction can be done by separately or simultaneously reducing each of the elements which determine the risk, SOI, EOH, FOE and POA. The measures taken should be reevaluated to check if they have introduced any new hazards.

The risk assessment process should be repeated until an acceptable risk level is

achieved. This called an “iterative” process.

Hazard ID #	EHSR	EN 12100 Clause	Generic Hazards	Actual Hazard – inc location, activity & persons at risk	Risk Estimation					Measures taken to eliminate or reduce risk	Risk Re - estimation					Residual Risks – information provided & warning labels
					SOI	EOH	FOE	POA	RISK		SOI	EOH	FOE	POA	RISK	Users Must be Warned of Residual Risks
1			**Mechanical**													
1.1	1.3.7	6.2.2.1 6.2.2.2	Crushing	Hands or other parts of people's body may be crushed by fan	2	1	3	2	12	Fully guards provided. Interlocked access doors.	1	1	2	1	2	1.Forbid unauthorized person close to the machine 2.Use warning sign
1.2	1.3.4	6.2.2.1 6.2.2.2	Cutting or severing	Hands or other parts of people's body may be crushed by fan	2	1	3	2	12	Fully guards provided. Interlocked access doors.	1	1	2	1	2	1.Forbid unauthorized person close to the machine 2.Use warning sign
1.3	1.3.7	6.2.2.1 6.2.2.2	Drawing-in or trapping	N.A.												
1.4	1.3.7	6.2.2.1 6.2.2.2	Entanglement	N.A.												
1.5	1.3.4	6.2.2.1 6.2.2.2	Friction or abrasion	N.A.												
1.6	1.3.3	6.2.2.1 6.2.2.2	Impact	N.A.												
1.7	1.3.2	6.2.10	Injection (e.g. high pressure fluids)	Pipe line break down or leaking /Inject into people eyes or other parts	2	1	3	2	12	Fully guards provided.	1	1	1	1	1	Routine inspection
1.8	1.3.7	6.2.2.1	Shearing	N.A.												
1.10	1.5.15	6.3.5.6	Slipping, tripping and falling	N.A.												
1.11	1.3.4	6.2.2.1	Stabbing or puncture	N.A.												

1.12	1.1.7 1.1.13	6.2.3	Suffocation	N.A.												
1.13	1.3.3	6.2.3 6.3.1	Falling or ejected objects	N.A												
1.14	1.3.1	6.2.6 6.3.2.6	Stability	N.A.												
1.15	1.3.2	6.2.3	Break up of machine	N.A.												
1.16	1.1.5	6.2.2.1	Run over (e.g. transportati	N.A.												
2			**Electrical**													
2.1	1.5.1	6.2.9	Contact electrocution	Closing or touching electrical parts - when the devices energized	3	2	2	2	24	- Safety circuit arranged in the power cabinet. - The easily touched conductive parts are	2	1	1	1	2	Low risk but warning label required. Residual risk highlighted in the manual.
2.2	1.5.2	6.2.9	Indirect contact – electrocution	Touch the machine cover- the machine has an electric leakage – injury to person	2	2	2	3	12	All electrical parts are protected by one cover. And cover is tightened by bolts which need tool to open.	1	1	1	1	1	Low risk.
2.3.	1.5.1	6.2.9	Approach to electrical parts	Touch the electrical parts and get an electric shock	2	1	2	2	8	All electrical parts are protected by one cover. And cover is tightened by bolts which need tool to open.	1	1	1	1	1	Low risk.
2.4	1.5.5	6.2.9	Electrical burns	Touch the electrical parts and get an electrical burns.	2	1	2	2	8	All the electrical parts have cabinets to forbid access and the cabinets have locks.	1	1	1	1	1	Low risk.
2.5	1.5.2	6.2.9	Electrostatic phenomena	Electrostatic phenomena / cause electrical equipment failure	2	2	2	1	8	Proper design - no area electrostatic accumulation	1	1	1	1	1	
2.6	1.5.10	6.2.3	Effects on medical implants	N.A.												
2.7	1.5.6	6.3.5.4	Fire	N.A.												
2.8	1.3.3	6.2.3 6.3.1	Projection of molten particles	N.A.												

2.9	1.1.6	6.2.8	Shock (e.g. after incident)	N.A.												
2.10	1.5.15	6.3.5.6	Falling / being thrown (e.g. during	N.A.												
3			**Thermal**													
3.1	1.5.5	6.2.3	Burn	Touching heating device / when the machine working / hands scald	1	1	3	3	9	Fixed guards installed; Interlocked access door.	1	1	2	2	4	Low risk but warning label required. Residual risk highlighted in user manual
3.2	1.1.6	6.2.8	Dehydration	N.A.												
3.3	1.1.6	6.2.8	Discomfort	N.A.												
3.4	1.5.5	6.2.9	Frostbite	N.A.												
3.5	1.5.5	6.2.3	Injuries by the radiation of heat	N.A.												
3.6	1.5.5	6.2.3	Scald	Touching with electrical heating device / when the machine working / hands scald	1	1	3	3	9	Fixed guards installed; Interlocked access door.	1	1	2	2	4	Low risk but warning label required. Residual risk highlighted in user manual
4			**Noise**													
4.1	1.5.8	6.2.2.2	Permanent hearing loss	N.A.												
4.2	1.5.8	6.2.2.2	Tinnitus	N.A.												
4.3	1.5.8	6.2.2.2 6.2.8	Interference of speech	N.A.												
4.4	1.1.6	6.2.8	Loss of awareness	N.A.												
4.5	1.1.6	6.2.8	Loss of balance	N.A.												

4.6	1.1.6	6.2.8	Discomfort	Working around the machine / When it works / People may feel uncomfortable if long time	1	2	3	2	12	Proper design for reducing noise emission; Keep wearing	1	2	1	1	2	Low risk but warning label required. Residual risk highlighted in user manual
4.7	1.1.6	6.2.8	Stress	N.A.												
5			**Vibration**													
5.1	1.5.9	6.2.3 6.3.4.3	Handheld	N.A.												
5.2	1.5.9	6.2.3 6.3.4.3	Whole body	N.A.												
5.3	1.5.9	6.2.3 6.3.4.3	Discomfort	N.A												
5.4	1.5.9	6.2.3 6.3.4.3	Low-back morbidity	N.A.												
5.5	1.5.9	6.2.3 6.3.4.3	Neurological disorder	N.A.												
5.6	1.5.9	6.2.3 6.3.4.3	Osteo-articular	N.A.												
5.7	1.5.9	6.2.3 6.3.4.3	Trauma of the spine	N.A.												
5.8	1.5.9	6.2.3 6.3.4.3	Vascular disorder	N.A.												
6			**Radiation**													
6.1	1.5.10	6.2.2.2 6.2.3	Lonising	N.A.												
6.2	1.5.11	6.3.4.5	Low frequency electromagne	N.A.												
6.3	1.5.10	6.2.3 6.3.4.5	Optical (e.g. infrared,	N.A.												
6.4	1.5.12	6.2.3 6.3.4.5	Laser	N.A.												
6.5	1.5.10	6.2.3 6.3.4.5 6.3.5.1	Radio frequency electromagne	N.A.												

7			**Material**													
7.1	1.1.3 1.5.1 3	6.2.2.2 6.2.3 6.2.4	Breathing / suffocation (aerosols, dust,	N.A.												
7.2	1.1.3 1.5.1 3	6.2.2.2 6.2.3	Cancer (biological / microbiological	N.A.												
7.3	1.1.3	6.2.2.2 6.2.3	Corrosion	N.A.												
7.4	1.1.3	6.2.2.2 6.2.3	Effects of reproduction capability	N.A.												
7.5	1.1.3	6.2.2.2 6.2.4 6.3.1	Explosion	The concentration of explosive gas exceed the prescribed limit	3	2	2	3	36	Concentration monitoring devices are installed, have forced ventilation function	1	2	2	1	4	Low risk but warning label required. Residual risk highlighted in user manual
7.6	1.1.3	6.2.2.2 6.2.4	Fire	The spray material accumulates and ignites	2	1	2	3	12	Fire extinguishers are required.	1	2	2	1	4	Low risk but warning label required. Residual risk highlighted in user manual
7.7	1.1.3	6.2.2.2 6.2.3	Infection / sensitization / mutation	N.A.												
7.8	1.1.3 1.5.1	6.2.2.2 6.2.3	Poisoning	N.A.												
8			**Ergonomic**													
8.1	1.1.6	6.2.8	Discomfort – unhealthy postures	N.A.												
8.2	1.1.6	6.2.8	Musculoskeletal disorder – inadequate consideration of	N.A.												
8.3	1.1.6 1.2.2	6.2.8	Fatigue	N.A.												
8.4	1.1.6	6.2.8	Stress	N.A.												
8.5	1.1.6	6.3.2.1	Mental overload / underload	N.A.												
8.6	1.1.4	6.2.7	Inadequate local lighting	N.A.												

8.7	1.2.2	6.2.11.8 6.3.2.1	Human error	N.A.													
8.8	1.1.6 1.2.2	6.2.11.8	Inadequate manual controls	a) Neglected use of personal protection equipment. b) Human errors resulting from poor positioning of controls and instruments. c)Hazards caused by incorrectly assembly.	2	1	2	2	8	Operation Instruction and Safety regulations should be followed	1	1	1	1	1	Professional staff operation
9			**Environmental**														
9.1	1.5.6 1.5.7	6.3.2.1 6.4.5.1	Dust / fog	N.A.													
9.2	1.5.1 6	6.2.11.1 1	Lightning	N.A.													
9.3	1.3.2	6.2.3 6.3.4.5	Water / moisture	N.A.													
9.4	1.3.2	6.2.3 6.3.4.5	Pollution	N.A.													
9.5	1.5.5	6.4.5.1	Temperature	N.A.													
9.6	1.3.2	6.3.2.1	Snow / ice	N.A.													
9.7	1.3.1	6.2.6	Wind	N.A.													
9.8	1.1.7	6.4.5.1 6.3.5.3	Lack of oxygen	N.A.													
10			**Combination**														
10.1			Repetitive activity + effort + high enviornmental	N.A.													

Part III ：Test report

EN 16985:2018 test report
Spray booths for organic coating material - Safety requirements

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
1		**Scope**				
2		**Normative references**				
3		**Terms and definitions**				
4		**List of significant hazards**				
	4.1	**General** This clause contains all the significant hazards, hazardous situations and events as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk. All hazards generated by spraying equipment for liquid paint and varnish and their ancillary devices are covered by EN 1953.	☑			Risk assessment has been done. Relevant protective measures are taken, information is given in user manual and warning signs are affixed on machine for residual risks.
	4.2 **4.2.1**	**Mechanical hazards** **Shearing, crushing and drawing in** These hazards are related to: -unexpected actuation of conveyor (whilst loading the combined booth) - fans (e.g. injuries caused by after-running of fan blades) and air change valves for the combined booth -damper adjusters (power driven dampers), -moving parts of combined booth (e.g. doors, gates and hoods).	☑			Risk assessment has been done. Relevant protective measures are taken, information is given in user manual and warning signs are affixed on machine for residual

	4.2.2	**Entrapment of operators** These hazards are related to: -obstacles or obstructions which can impede evacuation from the combined booth including any working pit in case of mechanical accident or the occurrence of fire; -accidental significant lowering of pressure inside the combined booth (i.e.: obstruction of air inlet) capable of -clamping the doors by mechanical deformation of the structure of the combined booth;	☑			This equipment of the machine satisfy the safety requirements. The door can be opened easily.
	4.2.3	**Hazards resulting from the operator slipping or falling:** These hazards are related to: ladders, gangways, platform or stairs; -floor gratings; - slippery floors; These hazards may be increased as a result of poor lighting.	☑			Floor gratings and antiskid, and lighting equipment of the machine satisfy the safety requirements
	4.3 4.3.1	**Electrical hazards** **Electrical shock (by direct or indirect contact)** These hazards are related to: -electrically live parts that are non insulated for operational reasons (for instance in electrostatic devices); -live parts when insulation is damaged by contact with solvents or by mechanical means.	☑			The equipment is well grounded, with relevant electrical protection, and the equipment maintenance check is in the manual.

	4.3.2	**External influence on electrical equipment** These hazards are related to: interaction of the electrostatic high voltage equipment elements of the control and safety systems which can cause dangerous malfunctions, e. g. short circuits on electronic safety circuits, entrance guards, alarm units.	☑			The electrical equipment is designed to operate correctly with the conditions of the supply.
	4.4	**Thermal hazards** These hazards are related to: - contact with hot surfaces within easy reach.	☑			Relevant protective measures are taken, information is given in user manual and warning signs are affixed on machine for residual
	4.5	**Hazards generated by noise** These hazards are related to combined booths and can be resent Inside as well as outside the booth. They can be generated by noises emitted for instance by: -fans; -excessive air velocity in ducts and accessories; -wet air washing systems; -air operated equipment (nozzles of atomising and spraying equipment, pumps, valves...).	☑			This equipment noise satisfy the safety requirements See the noise test report
	4.6	**Hazards generated by radiation** These hazards are related to the use of infra-red radiation (IR) causing -damage to the eyes, -burning.	☑			This equipment satisfy the safety requirements

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	4.7 **4.7.1**	**Hazards resulting from dangerous substances** Contact with/or absorption of, fluids (paints, solvents, hydraulic and thermal fluid) which are dangerous to health causing damage to the skin or eyes or dermatitis or allergies.	☑			The equipment is suitable for the physical environment and operating conditions of its intended use.
	4.7.2	Inhalation of aerosols and solvent vapours released by organic liquid coating materials.	☑			The equipment is suitable for the physical environment and operating conditions of its intended use.
	4.7.3	Inhalation of toxic gases released from the heating device (e.g. heating and combustion gases).	☑			The electrical equipment is suitable for the physical environment and operating conditions of its intended use.
	4.7.4	Inhalation of dangerous gases, vapours emitted by automatic fire extinguishing equipment.	☑			The key of electrical equipments have CE certificates or DoC. Have forced ventilation equipment Have portable fire extinguisher, no automatic fire extinguishing

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	4.8 **4.8.1**	**Fire and explosion hazards** **Fire hazards** Fire hazards are related to combustible or flammable substances coming in contact with ore are ignited by: -hot surfaces (e.g. heating systems and electrical equipment); -sparks created by mechanically induced energy (e.g. fans and/or conveyors); -electrostatic and atmospheric discharges; -electrical sparks; -welding and other heating sources used during maintenance operations. NOTE: Examples of flammable substances are: -coating materials, solvents or thinners; -elements of construction; -condensates and deposits of paint in the insulation materials, pits, exhaust ducts and filters; -fuels used in heating and drying system burners; -flammable liquid products used for cleaning; -petrol vapours from a vehicle fuel tank (in case of vehicle refinishing).	☑			All isolated parts in contact with the electrical component electrically bonded to the containing vessel; and Fan cooling, good grounding design of equipment. condensates and deposits of paint in the insulation materials, have Temperature sensor, can Over- temperature alarm

	4.8.2	**Explosion hazards** Explosion hazards are related to an increase of the concentration of flammable substances in air exceeding the lower explosion limit (LEL) and coming in contact with or are ignited by — hot surfaces (e.g. heating systems and electrical equipment); — sparks created by mechanically induced energy (e.g. fans and/or conveyors); — electrostatic and atmospheric discharges; — electrical sparks; — welding and other heating sources used during maintenance operations. NOTE Examples of flammable substances which increase concentration above the lower explosion limit: — solvent vapours from the spraying and drying process; — gases from fuels and/or products of combustion of the heating system; — gases released from deposits; — combustible heating gases; — petrol vapours.	☑			All isolated parts in contact with the electrical component electrically bonded to the containing vessel; and Fan cooling, good grounding design of equipment. condensates and deposits of paint in the insulation materials. Concentration monitoring devices are installed
	4.9 **4.9.1**	**Hazards caused by failure of the energy supply and malfunction of the control system** Failure of energy supplies can lead to: — Loss of monitoring functions resulting in hazardous reduction of ventilation flowrate; — unexpected shutdown of control devices; — loss of monitoring functions resulting in a hazardous increase of solvent concentration; — loss of monitoring functions resulting in a hazardous reduction of recirculation flow rate; — loss of lighting.	☑			The power switches have been used. It has a clear identification. The isolator can be locked in the off position. All the parts will not be live after the energy is cut off. Have power monitoring element, if failure of the energy supply, the system will normally stop work

	4.9.2	**Hazards due to failure or malfunction of the control system (unexpected start-up) which can lead to:** — Incorrect position of dampers resulting in a hazardous increase of solvent concentration; — wrong sequence of essential control functions resulting in a start of heating before forced ventilation is activated; — malfunction of temperature monitoring devices resulting in a hazardous increase of the temperatures of the heating system.	☑			The control systems are designed reliably.

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
5		**Safety requirements and/or measures**				
	5.1	**General** Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant which are not dealt with by this document (e.g. sharp edges). NOTE Hazards generated by spraying equipment for organic liquid coating materials and their ancillary devices are covered by EN 1953.	☑			See risk assessment report
	5.2.2	**Entrapment of persons** Combined booths shall be designed so that in case of an emergency all persons entrapped can find their way out of the combined booth in the quickest possible time, without being hindered by obstructions. NOTE Auxiliary use of robots or similar automatic devices is excluded from the scope (see scope, exclusions under d)). The doors provided for personnel: -shall be capable of being opened from inside and outside -shall be capable of being opened from inside by a mere push, independent of the air pressure (high or low) within the combined booth, -shall be self-closing, -shall have a minimum 800 mm width and minimum 2000 mm height (free opening). Combined booths shall be provided with a minimum of two permanently accessible and normally non-lockable doors placed as far as practically possible apart from each other. Also when the booth is loaded the operator shall not have more than 10m to travel in order to reach at least one of these doors. If the booth-loading door can be opened by a mere push from the inside only one additional personnel door shall be required. If the longest wall is less than 5m a single door is considered to be sufficient.	☑			This combined booth has emergency door and There is an emergency exit mark. The emergency door Meet the requirements of size and open mode.

	5.2.2	Power-operated doors as well as vertical and horizontal sliding doors cannot be considered as personnel door. Power-operated doors shall comply with EN 12433, EN 12445, EN 12453, EN 12635 and EN 12978. In addition the length and width of combined booths shall be a minimum of 1m on each side than of the biggest item to be painted.				
	5.2.3	**Slip and fall** Gratings, platforms and other surfaces likely to be walked upon shall be designed so as to minimise the risk of slipping or falling. Ladders, gangways and railings shall comply with EN ISO 14122-2, EN ISO14122-3 and EN ISO 14122-4. The grid sections, platforms or similar equipment shall be securely located within their housings, to avoid movement and instability. The combined booth shall be provided with adequate lighting, with 600 lux minimum.	☑			See risk assessment report about slipping or falling No Ladder, gangway and railings Meet the requirements The light comply the requirements

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	5.3 **5.3.1**	**Electrical** **General** Electrical equipment shall comply with EN 60204-1.				Refer to EN 60204-1 checklist
	5.3.2	**Electrical equipment** Protection against electrical shock shall comply with requirements of clause 6 of EN 60204-1:1997. The insulation of electrical equipment shall be resistant against solvents and other fluids. Electrical equipment shall be protected against outside mechanical influence. All mechanical conductive parts shall be earthed (see EN 60204-1) NOTE For spraying equipment, and ancillary equipment see EN 1953. For hand-held electrostatic guns see EN 50050 and EN 1953.	☑			See EN 60204-1 checklist
	5.3.3	**External influence on electrical equipment** All systems and apparatus relevant for safety shall be constructed in such way that they cannot be influenced by electromagnetic disturbances (see EN 61000-6-1, EN 61000-6-3, EN 61000-6-4).	☑			The design of the electrical equipment is considered this requirement.
	5.4	**Thermal** Protection against burns by hot surfaces shall be secured by means of appropriate insulation or protection against contact of all elements within arm′s reach and within the working area. According to EN 563 at an ambient temperature of 20 °C the surface temperature shall be less than 60 °C. Exceptions are permissible in small localised areas of the surface (for example flanges of burners, bolts, fan and roller shaft). NOT For safety of hot spraying systems, see EN 1953.	☑			The thermal comply the EN 563 requirements

	5.5	**Noise** A combined booth shall 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. The following measures can be adopted – where possible: — equipment set on anti-vibration supports; — flexible connections between the ducts and especially between fans and ducts; — choice of fan speed according to the most favourable noise curves; — air velocity reduction in ducts; — ducts soundproofing; — means to avoid transmission to the structure of the combined booth, of vibrations, resonances and any other noise generated by ancillary equipment that is permanently installed and connected to the booth. NOTE 1 This list is not exhaustive. EN ISO 11688-1 gives general technical information on widely recognised technical rules and means to design low- noise machinery. NOTE 2 EN ISO 11688-2 gives useful information on noise generation mechanisms in machinery. NOTE 3 For noise emitted by air compressors and spraying equipment see EN 1012-1 and EN 1953.	☑			See noise test report
	5.6	**Radiation** Infra-red heating systems shall be designed and constructed to minimise any harmful effect of radiation. The protection can be achieved by the following measures: — interlocking of all doors to shut down the heating system to prevent entry by personnel when the heaters are in use special barriers or special enclosure of the light tube. — Additional warning signs shall be fitted on the outside of the doors (see 7.2.1).	☑			The design of the radiation is considered this requirement. when the heaters are in use cannot open the door and have the warning signs outside of the door

	5.7 **5.7.1**	**Safety requirements against dangerous substances** **Contact with/or absorption of dangerous fluids (paints, solvents)** Contact with or absorption of dangerous substances sprayed shall be reduced by forced ventilation as far as possible (see 5.7.2). See also provisions for the information for use to be included in the instruction handbook in 7.2.2.	☑			See user manual
	5.7.2 **5.7.2.1**	**Inhalation of aerosols and solvent vapours** **Forced ventilation** In order to avoid inhalation of aerosols and solvent vapours the combined booth shall have an adequate forced ventilation taking into account: — type of application, — size and shape of items, — amount of dangerous substances sprayed, — exposure limit values relevant to the used coating material (examples given in annex "D").	☑			The design of the forced ventilation equipment is considered this requirement.
	5.7.2.2	**Airflow** The following measures shall be applied: Measures to prevent an atmosphere contaminated by aerosols and solvent vapours of organic liquid coating materials above the exposure limit values. The airflow shall be as uniform as possible. Furthermore, the escape of air containing solvent vapours in hazardous amounts or concentrations from the booth shall be prevented (e.g. preferably by maintaining a negative pressure within the booth). The airflow shall be directed in such a way that the operator is protected against inhalation of air contaminated by organic liquid coating materials at dangerous levels. For residual risks emanating from the hazards dealt with in this clause see 7.2.2.	☑			Concentration monitoring devices are installed, have forced ventilation function

	5.7.2.3	**Air velocity** Combined booths shall be designed for air velocities specified below for empty booth conditions as described in a), b) and c): a) For combined booths for similar items (e.g.: small vehicles, vans) and combined booths for large similar items (e.g.: buses, trucks): — The average of measured air velocities shall be at least 0,30 m/s, — Single measured values shall be at least 0,25 m/s. Corresponding measurement points are specified in annex B. b) For combined booths for industrial items of various sizes: The air velocity at any point shall not be less than 0,30 m/s. c) For combined booths with a working pit air velocities specified below shall be measured inside the working pit. The average of measured air velocities inside the working pit shall be at least 0,30 m/s. Single measured values inside the working pit shall be at least 0,25 m/s. Corresponding measurement points are specified in annex B. Special air velocities are acceptable for a combined booth where very long items are to be painted (e.g.: traincarriages, aeroplane), but the health and safety of the operator shall be ensured. The conditions for the health of the operator inside the combined booth shall be evaluated by special risk assessment. The use of personal breathing protective devices is required when spraying inside enclosures (e.g. train carriages, trucks, busses or in a working pit within the booth, see clause 7.2.2).	☑			All the safety requirements considered. Air velocities can be adjusted. And meet the requirement.

	5.7.2.4	**Monitoring of air velocity** Combined booths shall be provided with a device that is capable of monitoring air velocity performance. The ventilation air velocity shall not fall below that specified in 5.7.2.3 (see 5.8.2.5.1.). Failure of the ventilation system, or insufficient ventilation, shall be indicated by a visual and audible alarm (see EN 981).	☑			Have this device. And meet the requirement.
	5.7.3	**Inhalation of toxic gases released by the heating device** a) General Heating devices using combustible substances shall comply with specific standards EN 746-1, EN 746-2, andEN 525. To avoid reintroduction of contaminated air, the fresh air inlet duct shall be positioned apart from the exhaust air duct and (for indirect systems) the burner flue. The forced ventilation system shall be interlocked with the gas fuel admission to the burner. b) Direct fired systems Measures shall be taken to ensure that the use of a direct make-up heating system does not lead to adangerous gas concentration from combustion exceeding the exposure limit values specified by worker healthlegislation (for example see annex !D"). This can be achieved by a gas monitoring device which shuts down the heating system in the event of theexposure limit values being exceeded (see annex !D"). The forced ventilation system shall be interlocked with the gas fuel admission to the burner. Burners shall comply with EN 746-1.	☑			Heating devices using combustible substances comply EN 746-1, EN 746-2, and EN 525 requirements All the safety requirements considered. Burners comply with EN 746-1. requirements

	5.7.4	**Inhalation of dangerous gases, and vapours emitted by fire extinguishing equipment** When an automatic fire extinguishing system is installed, a warning device shall be provided, which sounds before discharge of dangerous fire extinguishing materials.	☑			All the safety requirements considered.

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	5.8 **5.8.1**	**Fire and explosion prevention and protection Fire prevention and protection** To preclude the fast propagation of fire, all elements of construction of the combined booth and its equipment shall comply with the requirements for fire prevention and protection of machines as described in EN 13478.	☑			Fire prevention and protection comply the EN 13478 requirements
	5.8.1.1	**Elements of construction** The following constituent elements shall be of non flammable material: — fixed elements of construction (such as walls, ceilings), — floors and gratings, — movable elements (such as loading and personnel doors), — ventilation ducts, which shall not affect the fire resistance of any wall traversed. The heat insulation and small components parts material properties shall not support a fire or increase the risk of fire. Filters used for air inlet and cleaning of exhaust air, flexible connections and sealing mastics shall be made of non-easily flammable material. NOTE Additional information on reaction to fire of combustible materials is given in annex !C".	☑			All the safety requirements considered.
	5.8.1.2	**Exhaust air ducts** Exhaust air ducts shall be provided with adequate hatches or removable sections for inspection and easy cleaning purposes.	☑			See user manual

	5.8.1.3 **5.8.1.3.1**	**Ventilation air heating system (see 3.18)** Heating systems shall comply with specific standard EN 746-2. The heating system shall not function unless forced ventilation or recirculation system is in operation. The air generator inlet and burner flame shall be installed out of the spraying area and outside zone 2.	☑			Heating systems comply with standard EN 746-2. And comply safety requirement
	5.8.1.3.2	**Over-temperature** Combined booths shall be equipped with a temperature limiting devices which in case of over-temperature (e.g. byexceeding the maximum allowed temperature) will cut off the heating system (see 5.8.2.1). Restart of the heating system shall not be automatic. The temperature control device shall indicate the temperature inside the ombined booth and the set point. The temperature control and temperature limiting device shall be independent. Temperature limitation shall not be required, if the heating medium, even in the case of operational failure, cannot elevate the combined booth temperature above the maximum drying temperature. After a breakdown of the heating device a purge of the air, within the combined booth to atmosphere shall be activated. It shall not be possible to start the heating device until this purge has been completed under the condition described in 5.8.2.1.	☑			The design of the control is considered and comply the safety requirement

	5.8.1.3.3	**Heating inside combined booth** Heating devices located inside the combined booth (e.g. IR-System, catalytic system) shall be designed so that they are not capable of igniting paint aerosols and solvent vapours. The following additional measures shall be taken: — Heating devices shall be permanently installed inside the booth; — in the spray mode an IR-System shall be protected against the coating material by a hood. Safe distance between heating elements and coated surfaces shall be stipulated (see 7.2.2).			☑	N/A Outside the combined booth
	5.8.1.4	**Fire extinguishing equipment** Manually operated or automatic fire extinguishing equipment shall be provided. Installation of automatic fire extinguishing equipment depends on the size of the combined booth, the presence of operator and the risk of fire (nature of coating material, spray processes). EN 13478 shall be taken into account.	☑			Comply with standard EN 13478
	5.8.2	**Explosion prevention and protection** The requirements shall ensure that the: — Concentration of flammable substances shall be maintained below 25 % of LEL by forced ventilation, — ignition sources are either eliminated or reduced (see EN 1127-1).	☑			Concentration monitoring devices are installed

	5.8.2.1	**Forced ventilation** The following requirements shall apply during both operation modes of the combined booth. Dilution of the flammable substances is achieved by forced ventilation which shall be calculated: for the spraying mode (see example of calculation in annex A); b) for the drying mode (annex A and annex B of EN 1539:2000). The solvent mixture and release rates shall be taken into consideration. Forced ventilation shall ensure uniform removal and not permit pockets of flammable substances to build up to levels above the admissible concentration. The forced ventilation shall at all times scavenge all spaces, sections, ducts and exhaust systems of the combined booth, preventing concentrations of flammable substances above the limiting level anywhere (with the exception of the boundary layer of the coated material and the spraying cone). Concentration of flammable substances shall be limited to 25 % of LEL. Where dampers are used a minimum volume flow shall be ensured even with the dampers set at minimum positionin order to guarantee the minimum exhaust flow rate. Heating source failure shall be followed by forced ventilation (see 5.8.1.3). The forced ventilation shall operate to purge the total space with a quantity of fresh air equal to or more than five times the total space, before the heating system can be restarted in drying mode (see also 5.8.1.3.2). The spraying device shall be able to operate only if forced ventilation is working effectively (5.8.2.5.1). In the event of forced ventilation failure, the spraying operation shall be stopped immediately and shall only be restarted when ventilation is restored. The heating system shall not function unless the forced ventilation system is operating.	☑			Have Forced ventilation device and when the flammable substances exceeds the limit is activated to dilution. Forced ventilation see the air flow diagram. The design of the this considered and comply the safety requirement. The current of the motor can be interrupted.

	5.8.2.2	**Hazardous area** The classification of hazardous zones is an integral part of the safety concept for explosion prevention. The ignition prevention category of equipment and components implemented to combined booth is dependent on limitation of flammable substance concentration by forced ventilation. As the concentration of flammable substances is limited to 25 % of LEL, the internal volume of the combined booth including ducts for recirculated and exhaust air and in external volumes but within a distance up to 1 m from permanent openings are classified as zone 2 during spray mode. NOTE Doors are not considered to be permanent openings.	☑			Hazardous area means meets this requirement.
	5.8.2.3 **5.8.2.3.1**	**Ignition sources** **General** In order to prevent hazardous by explosive atmospheres, the design and selection of electrical and non electrical equipment shall ensure that ignition sources are avoided in any part of the system, where areas with explosion hazard are classified (see 5.8.2.2) If electrical and non electrical equipment is implemented according to their manufacturer′s instruction, then the completed system is of the same category of protection.	☑			The operating means meets this requirement.

	5.8.2.3.2	**Electrical equipment** Electrical equipment installed and located in zone 2 shall be at least of category 3 complying with EN 60079-0 and EN 60079-15. In particular the following measures shall be considered: — all conductive components shall be interconnected and earthed according to EN 60204-1, — For lighting devices fitted behind transparent impact resistant panels sealed to the booth structure, so that solvent vapour inside the booth cannot ingress, IP 54 of EN 60529 is sufficient, — For motor outside the combined booths at least IP44 of EN 60529 shall be used. Motors shall not bepositioned within an exhaust air duct, — Control panel shall be situated outside the combined booth.	☑			Complying with EN 60079-0 and EN 60079-15 requirement ; See the EN60204 test report Lighting devices comply requirement the motor outside the combined booths Control panel outside the combined booth.
	5.8.2.3.3	**Non electrical equipment** All non electrical equipment and components installed and located in potentially explosive atmospheres shall be designed and constructed according to good engineering practice and shall be subjected to an ignition hazard assessment in accordance with 5.2 of EN 13463-1:2001 to provide the protection required. The equipment shall satisfy the requirements of EN 13463-1and EN 13463-5. Category 3 equipment for installation in zone 2 shall not contain any effective ignition source in normal operation. In particular the following requirements shall be observed: — hot surfaces of all apparatus inside the combined booth shall not able to ignite paint aerosols and solventvapours. The admissible temperatures of these hot surfaces are described in 6.4.2 of EN 1127-1:1997;	☑			The design of the control is considered and comply the safety requirement

		— electrostatic charges shall be avoided accordingly 7.4 of EN 13463-1:2001; — sparks caused by mechanical shocks, friction or collisions shall be avoided, especially for moving parts of fans for exhaust and recirculation air; — fans for exhaust and recirculation air shall be protected in accordance with !EN 14986".				Electrostatic charges meet EN 13463- 1:2001 and the equipment is well grounded. The fans protected meet EN14986
	5.8.2.4 **5.8.2.4.1**	**Explosion protection (drying mode)** **Forced ventilation** See 5.8.2.1.	☑			Meet the requirements, see the TCF files
	5.8.2.4.2	**Control systems** See 5.8.2.5.	☑			Meet the requirements, see the TCF files
	5.8.2.4.3	**Purging** See 5.8.2.1.	☑			Meet the requirements, see the TCF files
	5.8.2.4.4	**Heating system failure/forced ventilation control** See 5.8.2.1.	☑			Meet the requirements, see the TCF files
	5.8.2.4.5	**Heating source failure/purging** See 5.8.2.1.	☑			Meet the requirements, see the TCF files

	5.8.2.4.6	**Alarms** Visual and audible alarms shall indicate all failures identified above. These failures are: — exhausted airflow/recirculated airflow less than the minimum value — failure of heating — over temperature	☑			The design of the control is considered and comply the safety requirement
	5.8.2.5 **5.8.2.5.1**	**Safety devices and control systems** **Electric/electronic control systems** Electrical control, monitoring and measurement systems which are used in safety related functions to avoid the formation of — dangerous gases and vapours (limitation of hazardous substances concentration in air) And — explosive atmospheres (5.8.2.1 limitation of flammable substances concentration) shall fulfil the requirements of EN 954-1 category 3 and EN 1088. This may be designed using parts which meet category 1 but the combination of all parts shall meet category 3 as minimum. The minimum requirement is that faults in contactors or in auxiliary relays in the control circuits are detected and lead to power cut off. When using computers (e.g. Process computer) or PLC (Programmable Logic Control) for safety-related functions all malfunctions of the monitoring circuits shall be detected and lead to a power cut off which leaves the combined booth in a safe condition.	☑			The design of the control is considered and comply the safety requirement

		The combined booth shall be provided with devices which interlock the forced ventilation (see 5.8.2.1), heating and spraying operations. The interlocking device shall ensure the following safety related functions of control systems: — monitoring of the air velocity (see 5.7.2.3 and 5.7.2.4), — monitoring of recirculated air, — control of dampers, — monitoring the temperature of the heating surface on air as a function of maximum drying temperature, — emergency stop circuits, — prevention of spraying equipment activation before forced ventilation is working effectively, — prevention of IR-heating activation during spray mode, — start of automatic fire extinguishing system if necessary due to design.				
	5.8.2.5.2	**Hydraulic and pneumatic control systems** Where hydraulic and pneumatic systems can affect the forced ventilation flow rate, and/or the prevention of explosion or fire, their controls shall comply with at least category 1 of EN 954-1. Hydraulic and pneumatic systems shall comply with EN 982 and EN 983.	☑			Meet the requirements

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	5.9	**Failure of energy supply and malfunction of the control system** To avoid hazardous explosive mixtures being created within the combined booth by reduction in the forced ventilation flow rate, the fans shall not be fitted with any braking device which is initiated following mains power failure. Measures to prevent uncontrolled start-up (restart) shall be incorporated (see EN 1037). Locations of emergency exits shall be clearly indicated, for instance by luminous or powered exit signs.	☑			The design of the control is considered and comply the safety requirement
	5.10	**Emergency stop devices** Actuation of an emergency stop control shall not cause an interruption of the forced ventilation rate, if due to such interruption the generation of hazardous explosive mixtures is to be expected. The combined booth shall proceed in a safe state, see also 5.8.2.5.1. For design principles see EN 418. For a correct restart procedures after emergency stop see 5.8.2.1 (see also 7.2.2.).	☑			The design of the control is considered and comply the safety requirement

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	6 **6.1**	**Verification of the safety measure and/or measures** **General** Compliance is checked by a visual inspection (in particular with respect to moving parts) prior to commissioning.	☑			See user manual
	6.2	**Mechanical** Compliance is checked by the verification of the correct application of the requirements described in 5.2.1, 5.2.2and 5.2.3. The requirement of 600 lux minimum described in 5.2.3 can be checked by measurement. This measurement may, for instance, be taken at the point of 1m above the centre of the booth floor with the luxmeter reading vertically upwards.	☑			Meet the requirement 600 lux minimum, meet the requirement
	6.3 **6.3.1**	**Electrical** **Contact with live parts** Compliance is checked by applying the EN 60204-1 before commissioning, in particular the tests of 20.2, 20.3 and 20.4 of EN 60204-1:1997 shall be carried out and the results shall be recorded.	☑			See user manual And EN 60204-1 report
	6.3.2	Compliance with EN 61000-6-1, EN 61000-6-3, and EN 61000-6-4 shall be checked.			☑	
	6.4	**Thermal** Verification of these requirements shall be made by measuring temperatures of easily touchable surfaces according to EN 563.	☑			Meet the requirement, temperatures of easily touchable surfaces comply EN 563

	6.5	**Noise** The measurement of emission sound pressure level at operator's positions and of sound power level shall be carried out according to EN14462: 2005.	☑			See the Noise test report
	6.6	**Radiation** Compliance is checked by visual inspection of existence and correct installation of required safety equipment.	☑			Meet the requirement
	6.7 **6.7.1**	**Dangerous substances** **Contact with or absorption of dangerous fluids (paints, solvents)** Existence of instructions given in 7.2.2 shall be checked.	☑			Meet the requirement
	6.7.2 **6.7.2.1**	**Inhalation of aerosols and solvent vapours Forced ventilation** Compliance is checked carrying out tests and taking measurements of air velocity in accordance with annex B.	☑			Meet the requirement
	6.7.2.2	**Airflow** A smoke generator shall be placed in the paint application area to check that forced ventilation extracts the smoke.	☑			Meet the requirement
	6.7.2.3	**Air velocity** Air velocity shall be checked by measurements and tests according to annex B.	☑			Meet the requirement

	6.7.2.4	**Alarm for lack of ventilation** Compliance is checked by verification of type of alarm installed and practical testing of the alarm.	☑			Meet the requirement
	6.7.3	**Inhalation of toxic gases released by the heating device** Compliance of heating devices with specific standards shall be completed. Visual inspection and testing shall be carried out to ensure an effective interlock is fitted between the exhaust ventilation and gas supply to the burner.	☑			Meet the requirement
	6.7.4	**Inhalation of dangerous gases and vapours emitted by fire extinguishing equipment** If automatic fire extinguishing equipment is installed the fire alarm system shall be checked by visual inspection and test.	☑			Meet the requirement

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	6.8 **6.8.1**	**Fire and explosion** **Fire** The following points shall be checked by visual inspection and tests: — materials used for the construction of the combined booth to comply with the requirements in 5.8.1.1; — the walls are easy to clean; — installation of inspection hatches and/or removable sections of exhaust air ducts.	☑			The materials meet requirement Walls easy to clean and installation or remove
	6.8.2 **6.8.2.1**	**Explosion** **Forced ventilation** Verification of the concentration of flammable substances. a) In combined booths during spray mode, compliance with air velocity requirements in 5.7.2.3.a), b), c) shall be checked by measurements. b) For the drying mode in combined booth the concentration of flammable substances given in % of LEL shall be calculated by using equations given in annex A and annex B of EN 1539:2000. If the result of calculation is below or equal 10 % of LEL, measurements are not required. If the combined booth is a multizone booth, each section shall be considered separately for % of LEL calculation. The % of LEL of the most unfavourable zone shall be used.	☑			a) The design of the control is considered and comply the safety requirement, b) The calculated meet annex A and annex B of EN 1539:2000.

		If the result of calculation is above 10 % of LEL, the measurement shall be effected by using an explosimeter. The device shall be suitable for the use in explosive atmosphere. This explosimeter shall be calibrated according to the manufacturers information. Measurements shall be taken in the conditions of use (temperature, pressure, humidity etc.) specified by the manufacturer of the apparatus. Measurements shall not be taken at temperatures over the limit indicated by the manufacturer's explosimeter. Measurements shall not be taken between the spray gun and item to be painted.				
	6.8.2.2	**Hazardous area** Verification is not required	☑			
	6.8.2.3	**Measures to avoid or reduce ignition sources** Compliance of electrical and non electrical equipment with required categories for ignition protection shall be checked before commissioning All other requirements shall be checked visually. The correct functioning of safety devices described in 5.8.2.3, 5.8.2.4 and 5.8.2.5 shall be checked.	☑			See user manual
	6.8.2.4	Verification of the requirements and/or measures detailed in 5.8.2.4 may be carried out by inspection and/or testing of the function of the measures during commissioning	☑			See user manual

	6.8.2.5	Verification of the requirement and/or measures detailed in 5.8.2.5 may be carried out by inspection and /or testing of the function of the measures during commissioning	☑			See user manual
	6.9	**Failure of energy supply** Luminous warnings and lighting for emergency exits and their maintenance for 1hour to a minimum level of lighting after the failure of energy supply shall be visually checked. Safety circuits shall be checked before commissioning	☑			The design considered and comply the safety requirement
	6.10	**Emergency stop devices** Operating the emergency stop control shall bring the booth in the required safe state.	☑			The design considered and comply the safety requirement

Article	Sub-article	Requirement	Fulfillment			Remark
			Y	N	N/A	
	7 **7.1**	**Information for use General** **The manufacturer shall supply information for use for each combined booth.** Information for use shall be prepared in accordance with 5, and in particular with 5.5 (instruction handbook) and with 6.4 (Marking) of EN ISO 12100-2:2003. The information for use shall be written in the user's language and shall be accompanied by a copy written in theoriginal language of the manual, chosen by the manufacturer. Both documents shall be drawn up in a language of the European Economic Area (EEA). Specifications for the installation, commissioning and use, shall be provided together with normal maintenance information for the combined booth and the intended use.	☑			See user manual
	7.2 **7.2.1**	**Instruction handbook** **General** The instruction handbook shall contain the following minimum information: — exact description of the combined booth and its safety devices, — instruction for use together with requirements for the training of personnel, scope of application of the combined booth (permitted use, if necessary),	☑			See user manual

		— schematic diagram of the safety functions, — noise emission values determined according to EN 14462:2005," — Warnings against: — any storage of flammable substances or their empty containers or any other materials which have been in — contact with these products (rags, paper, etc.) in the combined booth and in front of the doors, — use of naked flames, incandescent objects, equipment or items capable of generating sparks (tools, — equipment, etc.), in the combined booth, — smoking in the hazardous zone. A display showing “No smoking” shall be affixed on both sides of all — entrance doors of the combined booth, — damage to the eyes and burning, when using IR, on all entrance doors. — Furthermore, the instruction handbook shall point at: — the use of trained and authorised personnel to make any adjustments to the combined booth for the operating conditions according to the manufacturer’s specifications, — the correct position of the operator, — the availability of at least suitable manually operated fire extinguishers.				

	7.2.2	**Instructions for use** **The instructions for use shall at least contain the following information:** — information and instructions for installation (e.g. foundation requirements, required floor space), — information and instructions for transportation, — information related to fitted safety devices and their function, as well as auxiliary devices, — set point for limiting temperature device, — description of the controls, — instruction for start up (operating), — information on earthing of a workpiece before starting spraying, — attention to the special hazards including fuel vapours (e.g. from vehicle fuel tank, pipes), explosive materials carried in the car (e.g. aerosol can, cigarette lighter), liquefied petroleum gas powered vehicles, batteries, — instruction for adjustment, — information on hazards which could occur despite the safety measures installed by the manufacturer (e.g. — instruction for loading by the user), — information regarding specific hazards generated by special applications (e.g. the potential fire risk from IR-heating system, safe distance between heating elements and coated surface) or by using special accessories,	☑			See user manual

		— building ventilation requirements: fresh air intake requirements shall be indicated so that the user can provide any necessary inlets into the areas of installation, — surrounding space of the combined booth, — information for correct restart procedures in case of failure of the forced ventilation or emergency stop, after an interruption, — information about unintended use: warnings particularly dangers associated with high concentrations of solvents, changing the coating products or the system, — instructions for detection of failures, repairs and clearance of faults (e.g. circuit diagrams for all services used complete with a description), — appropriate arrangements (for example provision of suitable protective clothing) when contact with materials used for spraying or cleaning could cause dermatitis or other skin complaints, — use of personal protection or a breathing mask connected to fresh air when an operator shall work inside train, carriages, trucks, busses or in working pit within the booth, — the operating method to be followed in the event of accidents, breakdowns or blockages, that are likely to occur."				

	7.2.3	**Instructions for maintenance** **These instructions shall at least contain the following information:** — check at regular intervals for the blocking of filtration and exhaust systems as well as deposits of coating materials on equipment, walls and floor of the combined booth, — indicate the frequency of filter replacement, — give precise instructions for maintenance of the heating device and especially the frequency of maintenance, — check at regular intervals the earthing of the combined booth, — indicate the safety precautions to be taken if any source of ignition is taken into the combined booth, — check for compliance with water treatment regulations (if applicable), — use of materials and special tools of the manufacturer, if needed, and use of given instruction for working with them, — requirements to switch off the power circuit before working on the ventilation system or automated damper adjuster, — the specifications of the spare parts to be used, when these affect the health and safety of operators	☑			See user manual

	7.2.4	**Information relating to the design parameters** This shall include for instance: — Intended use, — maximum sizes of the item(s)or object(s) to be painted, — air velocity measured according to this standard in (m/s), — maximum amount of flammable solvents contained in the coating material applied in one hour, — temperature limits of the air inside the combined booth during the application mode, — maximum allowed pressure drop through filtration system (e.g. water-wash type, dry filter type).	☑			See user manual
	7.3	**Marking** The combined booth shall be marked, clearly and indelibly with: — the business name and full address of the manufacturer and, where applicable, his authorized representative — model of the combined booth, — the year of construction, that is the year in which the manufacturing process is completed, — designation of the machinery," — serial number, — mandatory marking, — maximum size of the item or object to be painted,	☑			Meet the requirement.

		— air velocity (measured according to this standard) in m/s, — airflow output ..... m3/h (during spray mode), — maximum amount of flammable solvent contained in the coating material applied in one hour with indication of LEL of solvent taken in reference in annex A, — maximum admissible quantities of flammable substances, which will be released in drying mode, — maximum drying temperature [in degrees Celsius], — load capacity of the floor [in kg], — installed Power (electric ..... (kVA), other .....).				

Part III： Test report

3.2 EN60204-1 test report

Safety of machinery — Electrical equipment of machines — Part 1: General requirements

(See Annex12-EN 60204-1 test report No.: ETR20230427)

3.3 Airborne noise test report

I. Applicablestandards

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

II. Testinstrument

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

- Portable with light weight & easy operation.
- Measurement range from 35 to 130 dB(A).
- Type 1 precision.
- With "F" & "S" detect mode in accordance with IEC 651 type1.
- Built in A-weighting network.
- Equipped with a high prepolarized condenser microphone.
- With automatic & manual display.
- DC output for level recorder.

III. Measurementmethod

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.

Sound pressure level measurements shall be made either at the operating position of the machine, 1,6 m off the floor, or at four points around the machine 1,0 m away from the surface of the machine and 1,6 m off the floor.

IV. Testenvironment

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

V. Testresult

1. Background

   Reading value: 59dB(A)

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

Position	1	2	3	4
Reading (dB (A))	-	-	-	-

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

Position	1	2	3	4
Reading (dB(A))	70.8	70.3	68.3	69.9
Position	5	6	7	8
Reading (dB(A))	73.3	75.8	78.5	74.7
Position	9	10	11	12
Reading (dB(A))	71.1	70.6	70.9	69.5
Position	13	14	15	16
Reading (dB(A))	74.0	79.5	76.4	73.6
Position	Operating station			
Reading (dB(A))	76.6			

4. Sound power level (where the measuring value of sound pressure level exceeds 80 dB(A))

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

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

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

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

Testing Engineer: Chad Wang Date: 2023-05-30

Approval by: Kelvin Gao Date: 2023-05-30

Annex: Technical Information

Annex1. EC Declaration of Conformity
Annex2. Business license
Annex3. Product introduction
Annex4. Specifications table
Annex5. Manual
Annex6. Overview Drawing
Annex7. Electrical Diagram
Annex8. Part list
Annex9. Nameplate
Annex10. Warning label
Annex11. Product photo
Annex12. EN 60204-1 test report