TEST REPORT

EN ISO 12100:2010

Safety of machinery — General principles for design— Risk assessment and risk reduction

For

Shenzhen Shen Wangda Technology Co.,Ltd

4th floor, buiding C, KelunTe Low-carbonindustrial park, HuaRong Road, Longhua area, ShenZhen

Model: TBK958A, TBK958B, TBK958C, TBK958D, TBK958E, TBK958F, TBK958G, TBK958H, TBK958I, TBK958J, TBK958K, TBK958L, TBK958M, TBK958N, TBK958O, TBK958P, TBK958Q, TBK958R, TBK958S, TBK958T, TBK958U, TBK958V, TBK958W, TBK958X, TBK958Y, TBK958Z

2021-06-24

This Report Concerns: ☒ Original Report	**Equipment Type:** laser machine
Test Engineer:	Eric Tao/ Eric Tao
Report Number:	TH2106189-C01-R01
Test Date:	2021-06-17 to 2021-06-23
Reviewed By:	Prince Huang/ Prince Huang
Approved By:	Prince Huang/ Prince Huang
Prepared By:	**Shenzhen Tian Hai Test Technology Co.,Ltd.** 4F, A3 BLDG, The Silicon Valley Power intelligent terminal industrial park, Guan Lan street, Longhua district, Shenzhen Tel : 86-755-86615100 Fax: 86-755-86615105

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Tian Hai Test Technology Co,.Ltd.

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Safety of machinery–General principles for design–Risk assessment and risk reduction

Report		
Report reference No.	:	TH2106189-C01-R01
Tested by (+signature)	:	Eric Tao
Reviewed by (+signature)	:	Prince Huang
Approved by (+signature)	:	Prince Huang
Date of issue	:	2021-06-24
Testing laboratory		
Name	:	**Shenzhen Tian Hai Test Technology Co.,Ltd.**
Address	:	4F, A3 BLDG, The Silicon Valley Power intelligent terminal industrial park, Guan Lan street, Longhua district, Shenzhen
Test location	:	Same as above
Client		
Applicant Name	:	**Shenzhen Shen Wangda Technology Co.,Ltd**
Address	:	4th floor, buiding C, KelunTe Low-carbonindustrial park, HuaRong Road, Longhua area, ShenZhen
Manufacturer	:	**Shenzhen Shen Wangda Technology Co.,Ltd**
Address	:	4th floor, buiding C, KelunTe Low-carbonindustrial park, HuaRong Road, Longhua area, ShenZhen
Test specification		
Standards	:	EN ISO 12100:2010
Non-standard test method	:	N.A.
Test item		
Description	:	**laser machine**
Series models	:	TBK958A, TBK958B, TBK958C, TBK958D, TBK958E, TBK958F, TBK958G, TBK958H, TBK958I, TBK958J, TBK958K, TBK958L, TBK958M, TBK958N, TBK958O, TBK958P, TBK958Q, TBK958R, TBK958S, TBK958T, TBK958U, TBK958V, TBK958W, TBK958X, TBK958Y, TBK958Z
Trade mark	:	TBK
Rating	:	Input: AC 110V-220V 50-60Hz 3A 500W
Note:	:	All tests performed on model: TBK958A.

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

General remarks:

""See remark #)""refers to a remark appended to the report.
""See appended table)""refers to a table appended to the report.
Throughout this report a comma is used as the decimal separator.
The test results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of the testing laboratory.

Attachment include:
Appendix for photo
Remarks:
Copy of the marking plate

laser machine
Model: TBK958A
Input: AC 110V-220V 50-60Hz 3A 500W

CE

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Clause	**Requirement Test**	**Result**	**Verdict**
5	**Risk assessment**		P
	Risk analysis provides information required for the risk evaluation, which in turn allows judgments to be made about whether or not risk reduction is required	Complied	P
	These judgments shall be supported by a qualitative or, where appropriate, quantitative estimate of the risk associated with the hazards present on the machinery.		P
	The risk assessment shall be documented according to Clause 7		P
5.2	Information for risk assessment		P
	a) Related to machinery description:		P
	b) Related to regulations, standards and other applicable documents:		P
	c) Related to experience of use:		P
	d) Relevant ergonomic principles.		P
5.3	Determination of limits of machinery		P
5.3.1	General	Complied	P
	the characteristics and performances of the machine or a series of machines in an integrated process, and the related people, environment and products, should be identified in terms of the limits of machinery as given in 5.3.2 to 5.3.5.		P
5.3.2	Use limits		P
	a) the different machine operating modes and different intervention procedures for the users, including interventions required by malfunctions of the machine;		P
	b) the use of the machinery (for example, industrial, non-industrial and domestic) by persons identified by sex, age, dominant hand usage, or limiting physical abilities		P
	c) the anticipated levels of training, experience or ability of users including		P
	d)exposure of other persons to the hazards associated with the machinery where it can be reasonably foreseen:		P
5.3.3	Space limits		P
	a) the range of movement		P
	b) space requirements for persons interacting with the machine, such as during operation and maintenance,		P
	c) human interaction such as the operator–machine interface,		P
	d) the machine–power supply interface.		P
5.3.4	Time limits		P
	a) the life limit of the machinery and/or of some of its components (tooling, parts that can wear, electromechanical components, etc.), taking into account its intended use and reasonably foreseeable misuse		P
	b) recommended service intervals.		P
5.3.5	Other limits		N
	a) properties of the material(s) to be processed		N
	b) housekeeping — the level of cleanliness required		N
	c) environmental — the recommended minimum and maximum temperatures, whether the machine can be operated indoors or outdoors, in dry or wet weather, in direct sunlight, tolerance to dust and wet, etc.		N

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EN ISO 12100			
Clause	**Requirement Test**	**Result**	**Verdict**
5.4	Hazard identification	Complied	P
	a) Human interaction during the whole life cycle of the machine		P
	b) Possible states of the machine		P
	c) Unintended behaviour of the operator or reasonably foreseeable misuse of the machine		P
5.5	Risk estimation		P
5.5.1	General	Complied	P
	After hazard identification, risk estimation shall be carried out for each hazardous situation by determining the elements of risk given in 5.5.2. When determining these elements, it is necessary to take into account the aspects given in 5.5.3.		P
5.5.2	Elements of risk		P
	a) the severity of harm;		P
	b) the probability of occurrence of that harm, which is a function of		P
5.5.2.2	Severity of harm		P
	a) the severity of injuries or damage to health, for example,		P
	b) the extent of harm,		P
5.5.2.3	Probability of occurrence of harm		P
5.5.2.3.1	Exposure of persons to the hazard		P
	a)the need for access to the hazard zone		--
	b) the nature of access		--
	c) the time spent in the hazard zone,		--
	d) the number of persons requiring access		--
	e) the frequency of access.		--
5.5.2.3.2	Occurrence of a hazardous event		--
	a) reliability and other statistical data,		--
	b) accident history,		--
	c) history of damage to health,		--
	d) comparison of risks (see 5.6.3).		--
5.5.2.3.3	Possibility of avoiding or limiting harm		P
	a) different persons who can be exposed to the hazard(s)		P
	b) how quickly the hazardous situation could lead to harm		P
	c) any awareness of risk,		P
	d) the human ability to avoid or limit harm		P
	e) practical experience and knowledge		P
5.5.3	Aspects to be considered during risk estimation		P
5.5.3.1	Persons exposed		P
	Risk estimation shall take into account all persons (operators and others) for whom exposure to the hazard is reasonably foreseeable.		P
5.5.3.2	Type, frequency and duration of exposure		P
	The risk estimation shall also take into account tasks, for which it is necessary to suspend protective measures.		P
5.5.3.3	Relationship between exposure and effects		P
	The relationship between an exposure to a hazard and its effects shall be taken into account for each hazardous situation considered.		P
5.5.3.4	Human factors		P

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Clause	**Requirement Test**	**Result**	**Verdict**
	Human factors can affect risk and shall be taken into account in the risk estimation,		P
5.5.3.5	Suitability of protective measures		P
	a) identify the circumstances which can result in harm,		P
	b) whenever appropriate, be carried out using quantitative methods to compare alternative protective measures (see ISO/TR 14121-2),		P
	c) provide information that can assist with the selection of appropriate protective measures.		P
5.5.3.6	Possibility of defeating or circumventing protective measures		P
	Risk estimation shall take account of the possibility of defeating or circumventing protective measures. It shall also take account of the incentive to defeat or circumvent protective measures		P
5.5.3.7	Ability to maintain protective measures		P
	Risk estimation shall consider whether the protective measures can be maintained in the condition necessary to provide the required level of protection.		P
5.5.3.8	Information for use		P
	Risk estimation shall take into account the information for use, as available. See also 6.4.		P
5.6	Risk evaluation		P
5.6.1	General		P
	Achieving the objectives of risk reduction and a favourable outcome of risk comparison applied when practicable gives confidence that risk has been adequately reduced.		P
5.6.2	Adequate risk reduction		P
	Application of the three-step method described in 6.1 is essential in achieving adequate risk reduction.		P
5.6.3	Comparison of risks		P
6	**Risk reduction**		P
6.1	General	Complied	P
	All protective measures intended for reaching this objective shall referred to as the three-step method (see also Figures 1 and 2).		P
6.2	Inherently safe design measures		P
6.2.1	General		P
	Inherently safe design measures are achieved by avoiding hazards or reducing risks by a suitable choice of design features for the machine itself and/or interaction between the exposed persons and the machine.		P
6.2.2	Consideration of geometrical factors and physical aspects		P
6.2.2.1	Geometrical factors		P
	a) The form of machinery is designed to maximize direct visibility of the working areas and hazard zones from the control position — reducing blind spots,		P
	b) The form and the relative location of the mechanical components parts		P
	c) Avoiding sharp edges and corners, protruding parts		P
	d) The form of the machine is designed so as to achieve a suitable working position and provide accessible manual controls (actuators).		P

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Clause	**Requirement Test**	**Result**	**Verdict**
6.2.2.2	Physical aspects		P
	a) limiting the actuating force to a sufficiently low value so that the actuated part does not generate a mechanical hazard		P
	b) limiting the mass and/or velocity of the movable elements, and hence their kinetic energy		P
	c) limiting the emissions by acting on the characteristics of the source using measures for reducing		P
6.2.3	Taking into account general technical knowledge of machine design		P
	a) mechanical stresses		P
	b) materials and their properties		P
	c) emission values		P
6.2.4	Choice of appropriate technology		P
	One or more hazards can be eliminated or risks reduced by the choice of the technology to be used in certain applications		P
6.2.5	Applying principle of positive mechanical action		P
6.2.6	Provisions for stability		P
	Machines shall be designed so that they have sufficient stability to allow them to be used safely in their specified conditions of use.		P
6.2.7	Provisions for maintainability		P
	– accessibility, taking into account the environment and the human body measurements, including the dimensions of the working clothes and tools used;		P
	– ease of handling, taking into account human		P
	– limitation of the number of special tools and equipment.		P
6.2.8	Observing ergonomic principles		P
	Ergonomic principles shall be taken into account in designing machinery so as to reduce the mental or physical stress of, and strain on, the operator.		P
6.2.9	Electrical hazards		P
	For the design of the electrical equipment of machines, IEC 60204-1 gives general provisions about disconnection and switching of electrical circuits and for protection against electric shock.		P
6.2.10	Pneumatic and hydraulic hazards		P
6.2.11	Applying inherently safe design measures to control systems		P
6.2.11.1	General		P
	The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction (see ISO 13849-1 or IEC 62061).		P
6.2.11.2	Starting of an internal power source/switching on an external power supply		P
	The starting of an internal power source or switching-on of an external power supply shall not result in a hazardous situation.		P
6.2.11.3	Starting/stopping of a mechanism		P
6.2.11.4	Restart after power interruption		P

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Clause	**Requirement Test**	**Result**	**Verdict**
6.2.11.5	Interruption of power supply		P
	Machinery shall be designed to prevent hazardous situations resulting from interruption or excessive fluctuation of the power supply.		P
6.2.11.6	Use of automatic monitoring		P
	Automatic monitoring is intended to ensure that a safety function or functions implemented by a protective measure do not fail to be performed if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed such that hazards are generated		P
6.2.11.7	Safety functions implemented by programmable electronic control systems		P
6.2.11.7.1	General		P
	A control system that includes programmable electronic equipment (for example, programmable controllers) can, where appropriate, be used to implement safety functions at machinery.		P
6.2.11.7.2	Hardware aspects		P
	– architectural constraints		P
	– selection, and/or design, of equipment and devices with an appropriate probability of dangerous random hardware failure		P
	– the incorporation of measures and techniques within the hardware so as to avoid systematic failures and control systematic faults		P
6.2.11.7.3	Software aspects		P
6.2.11.8	Principles relating to manual control		P
6.2.11.9	Control mode for setting, teaching, process changeover, fault-finding, cleaning or maintenance		P
6.2.11.10	Selection of control and operating modes		P
6.2.11.11	Applying measures to achieve electromagnetic compatibility (EMC)		P
6.2.11.12	Provision of diagnostic systems to aid fault-finding		P
6.2.12	Minimizing probability of failure of safety functions		P
6.2.12.1	General		P
	Safety of machinery is not only dependent on the reliability of the control systems but also on the reliability of all parts of the machine.		P
6.2.12.2	Use of reliable components		P
6.2.12.3	Use of “oriented failure mode” components		P
6.2.12.4	Duplication (or redundancy) of components or subsystems		P
6.2.13	Limiting exposure to hazards through reliability of equipment		P
6.2.14	Limiting exposure to hazards through mechanization or automation of loading (feeding)/ unloading (removal) operations		P
6.2.15	Limiting exposure to hazards through location of setting and maintenance points outside danger zones		P
6.3	Safeguarding and complementary protective measures		P
6.3.1	General		P

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Clause	**Requirement Test**	**Result**	**Verdict**
	Guards and protective devices shall be used to protect persons whenever an inherently safe design measure does not reasonably make it possible either to remove hazards or to sufficiently reduce risks.		P
6.3.2	Selection and implementation of guards and protective devices		P
6.3.2.1	General		P
	This subclause gives guidelines for the selection and the implementation of guards and protective devices the primary purpose of which is to protect persons against hazards generated by moving parts, according to the nature of those parts (see Figure 4) and to the need for access to the danger zone(s).		P
6.3.2.2	Where access to the hazard zone is not required during normal operation		P
6.3.2.3	Where access to the hazard zone is required during normal operation		P
6.3.2.4	Where access to the hazard zone is required for machine setting, teaching, process changeover, fault-finding, cleaning or maintenance		P
6.3.2.5	Selection and implementation of sensitive protective equipment1)		P
6.3.2.5.1	Selection		P
6.3.2.5.2	Implementation		P
6.3.2.5.3	Additional requirements for sensitive protective equipment when used for cycle initiation		P
6.3.2.6	Protective measures for stability		P
6.3.2.7	Other protective devices		P
6.3.3	Requirements for design of guards and protective devices		P
6.3.3.1	General requirements		P
6.3.3.2	Requirements for guards		P
6.3.3.2.1	Functions of guards		P
6.3.3.2.2	Requirements for fixed guards		P
	permanently		P
	by means of fasteners (screws, nuts) making removal/opening impossible without using tools; they should not remain closed without their fasteners (see ISO 14120).		P
6.3.3.2.3	Requirements for movable guards		P
	a) as far as possible when open remain fixed to the machinery or other structure (generally by means of hinges or guides)		P
	b) be interlocking (with guard locking when necessary) (see ISO 14119).		P
6.3.3.2.4	Requirements for adjustable guards		P
6.3.3.2.5	Requirements for interlocking guards with a start function (control guards)		P
6.3.3.2.6	Hazards from guards		P
	– the guard construction (sharp edges or corners, material, noise emission, etc.),		P
	– the movements of the guards (shearing or crushing zones generated by power-operated guards and by heavy guards which are liable to fall).		P
6.3.3.3	Technical characteristics of protective devices		P

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Clause	**Requirement Test**	**Result**	**Verdict**
6.3.3.4	Provisions for alternative types of safeguards		P
6.3.4	Safeguarding to reduce emissions		P
6.3.4.1	General		P
	If the measures for the reduction of emissions at source specified in 6.2.2.2 are not adequate, the machine shall be provided with additional protective measures (see 6.3.4.2 to 6.3.4.5).		P
6.3.4.2	Noise		P
6.3.4.3	Vibration		P
6.3.4.4	Hazardous substances		P
6.3.4.5	Radiation		P
6.3.5	Complementary protective measures		P
6.3.5.1	General		P
6.3.5.2	Components and elements to achieve emergency stop function		P
6.3.5.3	Measures for the escape and rescue of trapped persons		P
6.3.5.4	Measures for isolation and energy dissipation		P
6.3.5.5	Provisions for easy and safe handling of machines and their heavy component parts		P
6.3.5.6	Measures for safe access to machinery		P
6.4	Information for use		P
6.4.1	General requirements		P
6.4.2	Location and nature of information for use		P
6.4.3	Signals and warning devices		P
6.4.4	Markings, signs (pictograms) and written warnings		P
	a) for its unambiguous identification		P
	b) in order to indicate its compliance with mandatory requirements, comprising		P
	c) for its safe use		P
6.4.5	Accompanying documents (in particular — instruction handbook)		P
6.4.5.2	Production of instruction handbook		P
6.4.5.3	Drafting and editing information for use		P
7	**Documentation of risk assessment and risk reduction**		P

TABLE: 18.3	**Insulation resistance and dielectric strength**		**P**
Test points		Measured value	Limit
From	To		
Line &neutral	Metal Enclosure	>100MΩ	1MΩ
Line &neutral	Plastic Enclosure	>100MΩ	1MΩ

TABLE: 18.4	**Eectric strength measurements**	**P**
Test voltage applied between:	Test voltage (V rms)	Breakdown
Line &neutral to Metal Enclosure	1000	No
Line &neutral to Plastic Enclosure	1000	No

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Appendix for EUT photos

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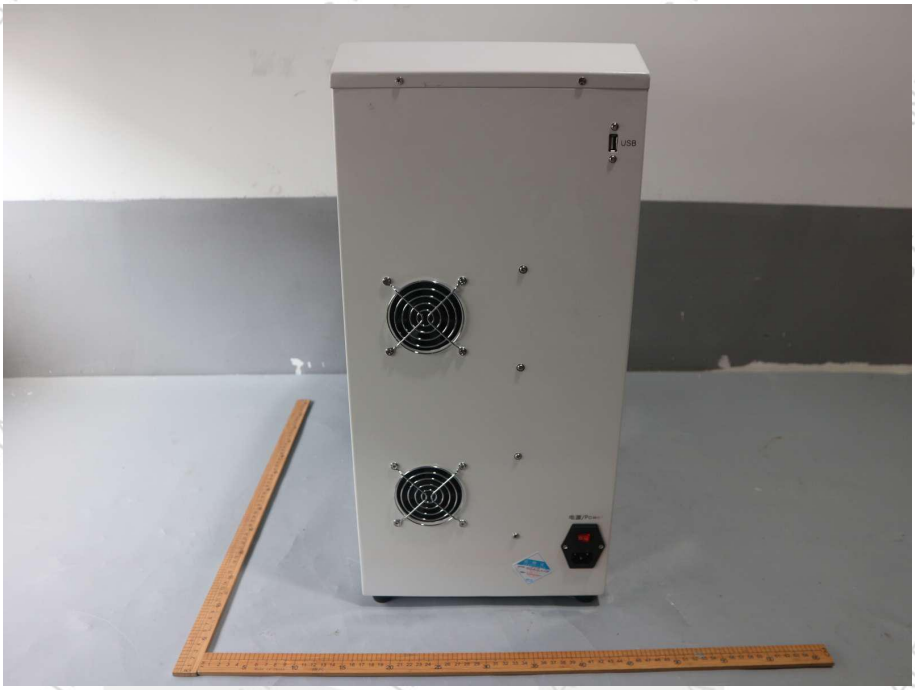

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