

Test Report

Report No.: GZEE240700313831

Date: 2025-02-21

The following sample(s) was/were submitted and identified on behalf of the client as:

Applicant: Shenzhen Dynalasers Technology Co., Ltd.
Room 301, Building F, Hongwei Industrial Park, No. 6, Liuxian 3rd Road,
Xingdong Community, Xinan Street, Bao'an District, Shenzhen, Guangdong,
China

Manufacturer: Same as applicant

Factory: Same as applicant

Testing location/address: SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
198 Kezhu Road, Science City, Economic & Technology Development Area,
Guangzhou, Guangdong, China

Standard(s): EN 60825-1: 2014 + A11: 2021
Safety of laser products - Part 1: Equipment classification and requirements

Test item description: Handheld Laser Welding Machine


Trade Mark/Brand: —

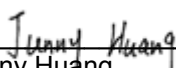
Model/Type reference: D50P, D60P, D70P

Ratings: AC 220 V; 50 Hz; max laser power 1500 W

Test result: The test sample belongs to Class 4 according to EN 60825-1: 2014 + A11: 2021.

Remark: Throughout this report a comma is used as the decimal separator.


Alex Tan
Reviewer
E&E Safety Laboratory


Junny Huang
Project Engineer



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Summary of testing:

Model D70P was selected to test due to the maximum laser power output.

The product was tested the laser radiation under normal operation and evaluated to be Class 4 according to EN 60825-1: 2014 + A11: 2021.

Use of uncertainty of measurement for decisions on conformity (decision rule) :

No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

Test item particulars.....:

Classification of installation and use: Fixed

Supply Connection: AC power supply

Possible test case verdicts:

- test case does not apply to the test object: N/A

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement: F (Fail)

Testing.....:

Date of receipt of test item: 2024-07-23

Date (s) of performance of tests.....: 2024-08-01

General product information:

The product can emit strong infrared light or red positioning laser when powered.

All models are the same except the model's name and laser power.

Object / part No.	Manufacturer/ trademark	Type / model	Technical data
Laser system	Same as applicant	Fiber laser	1080 nm; Max 1500 W
Laser system	Same as applicant	Fiber laser	650 nm; Max 1 mW



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Clause	Requirement + Test	Result - Remark	Verdict
4	CLASSIFICATION PRINCIPLES		
4.3	Classification rules		---
4.3 a	Radiation of a single wavelength		N/A
4.3 b	Radiation of multiple wavelengths		P
	1) Laser product emits at two or more wavelengths shown as additive in Table 1		P
	2) Laser product emits at two or more wavelengths not shown as additive in Table 1		N/A
4.3 c	Radiation from extended sources (see 5.4.3)		N/A
4.3 d	Non-uniform, non-circular or multiple apparent source		N/A
4.3 e	Time bases		---
	1) 0,25 s	Select for class 2 evaluation	P
	2) 100 s	Select for class 4 evaluation	P
	3) 30000 s		N/A
4.3 f	Repetitively pulsed or modulated lasers		N/A
	1) Any single pulse		N/A
	2) Average power for pulse trains		N/A
	3) Pulse duration $t \leq T_i$: Number of pulses N and C_5:		N/A
	3) Pulse duration $t > T_i$: Number of pulses N and C_5:		N/A
4.4	Laser products designed to function as conventional lamps.		N/A
	α measured at 200 mm distance from closest point of human access ($\alpha > 5$ mrad).		N/A
	Un-weighted radiance L measured at 200 mm distance (comparison with $L_T = 1 \text{ MWm}^{-2}\text{sr}^{-1}/\alpha$) under reasonably foreseeable single fault conditions.		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Evaluation of emission according to IEC 62471 series (optional): Standard applied (IEC 62471 series).....: Risk Group.....: Labelling.....: Classification of product based on accessible laser radiation (if no laser radiation accessible: Class 1).		N/A
5	DETERMINATION OF THE ACCESSIBLE EMISSION LEVEL and PRODUCT CLASSIFICATION		
5.1	Tests		---
	Compliance under reasonably foreseeable single fault conditions.	Class 4 laser product, no need to fault condition tests	N/A
5.3	Determination of the class of the laser product: For Class 1C: vertical safety standard applied with requirements for Class 1C.		---
5.4	Measurement geometry		---
5.4.1	General		---
5.4.2	Default (simplified) evaluation		P
	Conditions applied	Condition 3 (Condition 1 was not considered because the laser products was intended for use exclusively indoors)	P
	Aperture diameter	7 mm (for Condition 3)	P
	Reference point	Surface of diffuser (For condition 3)	P
	Measurement distance	100 mm (for Condition 3)	P
	(for each condition)		
5.4.3	Evaluation condition for extended sources		---
	Conditions applied		N/A
	Most restrictive position		N/A
	(distance from reference point)		
	Angular subtense of the apparent source α and C_6 : (for each condition)		N/A
5.4.3 a	Aperture diameters (for each condition).....:		N/A
5.4.3 b	Angle of acceptance (for each condition).....:		N/A



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Measured laser radiation, calculations and comparison with AEL limits:

1. TEST CONDITIONS

- 1) General requirement
All measurements were performed at dark room.
Temperature: 20 – 25 °C
Relative humidity: Max. 75 %
- 2) Normal operation
The Laser is simulating normal operation to emit intentional optical power.
- 3) Fault condition: Refer to the test result.

2. MEASUREMENT METHOD

- 1) Measurement of Peak wavelength
The Laser is simulating normal operation to emit intentional optical power.
- 2) Measuring distance
For condition 3: $r = 100$ mm. If the reference point is located inside of the protective housing (i.e. is not accessible) at a distance from the closest point of human access further than the measurement distance 100 mm, the measurement shall be carried out at the closest point of human access.
For condition Skin/Cornea/Iris hazard: $r = 0$ mm
- 3) Measurement of radiant power/energy

The radiant power emitted from Laser of the product is measured under normal operation and fault condition used optical power/energy meter.

In case of condition 3, Laser radiation is collected through a circular aperture stop having a diameter 7 mm and its location is 100 mm away from the apparent source. If the reference point is located inside of the protective housing at a distance from the closest point of human access further than the measurement distance 100 mm, the measurement shall be carried out at the closest point of human access. When using Default (simplified) evaluation, circular field stop was removed. See below picture.



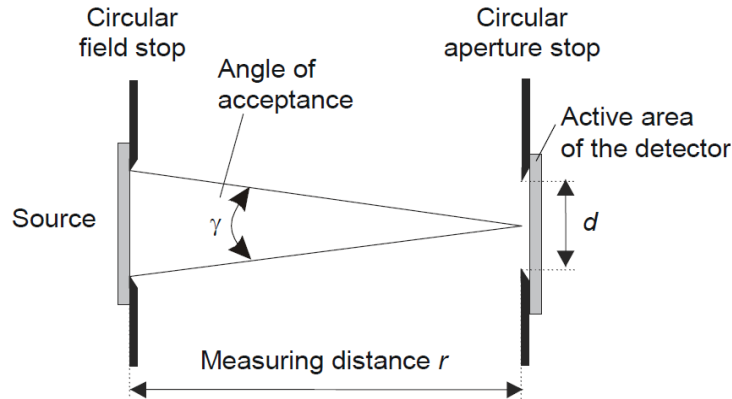
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In case of condition Skin/Cornea/Iris Hazard, Laser radiation is collected through a circular aperture stop having a diameter 3,5 mm and its location is 0 mm away from the apparent source.

The measurement is performed at a position to detect a maximum radiation emitted from the apparent source.

3. TEST RESULT

All below measurements were performed at dark room with ambient temperature $24,5 \pm 0,5$ °C, Relative humidity $60 \pm 5\%$, the product was powered by AC power supply.

- 1) Measurement of wavelength
 $\lambda_1 = 1080$ nm (infrared), $\lambda_2 = 650$ nm (red)
- 2) Measurement of laser radiant power
☒ Used simplified (default) method, Angle of acceptance & Angular subtense of the apparent source was not considered.
☐ Used extended sources evaluation method

For 1080 nm (based on the announcement of client)

Normal operation	Test Condition	Angle of acceptance (mrad)	Angular subtense of the apparent source (mrad)	Power (W)
	Condition 3	—	—	1500

For 650 nm:

Normal operation	Test Condition	Angle of acceptance (mrad)	Angular subtense of the apparent source (mrad)	Power (mW)
	Condition 3	—	—	0,81
	Condition Skin/Cornea/Iris hazard	—	—	1,62



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4. CLASSIFICATION OF LASER RADIATION

1) Compare the accessible emission level of radiation emitted from Laser of the product with the accessible emission limit of certain class. This comparison is evaluated using the measurement value under each condition. Accessible emission levels are measurement value or calculated from the measurement value if necessary.

2) Comparison with AEL

For 650 nm:

Test Condition	Condition 3
Time base	0,25 s
Correction factor	C6 = 1
AE (mW)	0,81
AEL Class 1	0,39 mW
AEL Class 2	1 mW

Conclusion:

Measured emission power is not exceeding the AEL for Class 2, therefore the laser is classified as Class 2.

Test Condition	Skin /Cornea /Iris hazard
Time base	100 s
Correction factor	C6 = 1
AE (mW)	1,62
AEL Class 3B	500 mW

Conclusion:

Measured emission power of Skin/Cornea/Iris hazard is not exceeding the AEL for Class 3B, no need warning for potential hazard to the skin or anterior parts of the eye.

For 1080 nm:

Test Condition	Condition 3
Time base	100 s
Correction factor	C6 = 1
AE (W)	1500
AEL Class 3B	0,5 W

Conclusion:

Measured emission power is exceeding the AEL for Class 3B, therefore the product is classified as Class 4 laser product.



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6	ENGINEERING SPECIFICATIONS		
6.2	Protective housing		—
6.2.1	General		—
	Protective housing prevents access to energy levels in excess of the AEL for Class 1.	Class 4 laser product, no protective housing, and using connectors to link to software for control	N/A
	Protective housing prevents access to energy levels equivalent to Class 4 and withstands exposures under reasonably foreseeable single fault conditions.		N/A
	Maintenance of Class 1, 1C, 1M, 2, 2M, or 3R (access to emissions of Class 3B or 4 is prevented).		P
	Maintenance of Class 3B product (access to emission of Class 4 is prevented).		N/A
6.2.2	Service		N/A
6.2.3	Removable laser system (laser system complies with requirements of Clauses 6 and 7).		N/A
6.3	Access panels and safety interlocks		—
6.3.1	Panel is intended to be removed during operation (or maintenance) and would give access to higher energy levels (see Table 13).	Using connectors to link to software for control	N/A
	Accessible emission (after removal of the panel) corresponds to product Class (designated by "X" in Table 13)		N/A
	Emission through the opening if interlocked panel of Class 1, 1C, 1M, 2, or 2M is removed (Emission < AEL of Class 1M or 2M).		N/A
	Emission through the opening if interlocked panel of Class 3R, 3B, or 4 is removed (Emission < AEL of Class 3R).		N/A
	Requirements regarding reasonably foreseeable single fault condition.		N/A
6.3.2	Override mechanism		—
	Behaviour of override in operation when the panel is replaced.		N/A



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	Visible or audible warning for override mode.		N/A
6.4	Remote interlock connector	Using connectors to link to software for control	P
6.5	Manual reset		P
6.6	Key control		P
6.7	Laser radiation emission warning		—
6.7.1	Laser product is a 3R ($\lambda < 400$ nm; $\lambda > 700$ nm), 1C, 3B or 4 laser systems.		P
6.7.2	Audible or visible warning.	Using connectors to link to additional indicator lamp and software for control	P
	Warning is failsafe or redundant.	Using connectors to link to additional indicator lamp and software for control	P
	Viewing of the visible warning does not require exposure to emissions > AEL for Class 1M and 2M.		N/A
6.7.3	Operational control and laser aperture are provided with a warning device when they are separated more than 2 m from warning device.		N/A
6.7.4	Visible indication of output aperture if laser emission may be distributed through more than one output.		N/A
6.7.5	Switch for handheld Class 3R device must be depressed for emission (in lieu of emission indicator).		N/A
6.8	Beam stop or attenuator		N/A
6.9	Controls		N/A
6.10	Viewing optics		N/A
	a) Human access to laser radiation in excess of Class 1M prevented when the shutter is opened or attenuation varied.		N/A
	b) Opening of the shutter or variation of the attenuation prevented when exposure to laser radiation in excess of Class 1M is possible.		N/A
6.11	Scanning safeguard		N/A
6.12	Safeguard for Class 1C products		N/A



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	a) Human access to laser radiation in excess of AEL for Class 1 measured under Condition 3 is prevented.		N/A
	b) Human access to laser radiation in excess of AEL for Class 3B measured through 3,5 mm aperture at 5 mm distance from applicator is prevented.		N/A
6.13	Walk-in access		N/A
	a) Means provided so that any person inside the housing can prevent activation of Class 3B or 4 laser hazards.		N/A
	b) A warning device provides adequate warning of emission to any person within the housing.		N/A
	c) Where "walk-in" access during operation is intended or reasonably foreseeable, emission of laser radiation that is equivalent to Class 3B or 4 while someone is present inside the enclosure of Class 1, Class 2 or Class 3R product is prevented by engineering means.		N/A
6.14	Environmental conditions		—
	- climatic conditions		P
	- vibration and shock		N/A
6.15	Protection against other hazards		—
6.15.1	Non-optical hazards (product safety standard)		—
	- electrical hazards;		N/A
	- excessive temperature;		N/A
	- spread of fire from the equipment;		N/A
	- sound and ultrasonics;		N/A
	- harmful substances;		N/A
	- explosion;		N/A
6.15.2	Collateral radiation		N/A
6.16	Power limiting circuit		N/A
7	LABELLING		
7.1	General		—
	Labels durable, permanently affixed		P



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Test Report

Report No.: GZEE240700313831

Date: 2025-02-21

Clause	Requirement + Test	Result - Remark	Verdict
	Labels clearly visible		P
	Reading of labels is possible without exposure to laser radiation in excess of AEL for Class 1.		P
	Colour combination		P
	Labelling impractical due to the size or design of the product.		P
	Warning label – Hazard symbol (Figure 3)		P
7.2 - 7.7	Text on explanatory label or pictogram (laser class, warning text)		P
7.8	Aperture label		P
7.9	Radiation output and standards information		—
	Max output of laser radiation	See Annex 1	P
	Pulse duration		N/A
	Emitted wavelength(s)	See Annex 1	P
	Name and publication date of the standard	See Annex 1	P
7.10	Labels for access panels		N/A
7.10.1 a) – f)	Labels for panels - warning wording used		N/A
7.10.2	Labels for safety interlocked panels - Warning wording used		N/A
7.11	Warning for invisible laser radiation	See Annex 1	P
7.12	Warning for visible laser radiation	See Annex 1	P
7.13	Warning for potential hazard to the skin or anterior parts of the eye - warning wording used		N/A
8	OTHER INFORMATIONAL REQUIREMENTS		
8.1	Information for the user		—
	a) adequate instructions for assembly, maintenance and safe use and description of the classification limitations, if appropriate.		P
	b) additional warning for Class 1M and 2M		N/A
	c) laser beam parameters for radiation above the AEL of Class 1		—



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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> Wavelength 	See Annex 1	P
	<ul style="list-style-type: none"> Beam divergence 		N/A
	<ul style="list-style-type: none"> Pulse pattern (pulse duration, repetition rate, ...) 		N/A
	<ul style="list-style-type: none"> Maximum power or energy output 	See Annex 1	P
	d) safety instruction for embedded laser products and other incorporated laser products.		P
	e) MPE and NOHD for Class 3B and 4 laser products; For collimated beam Class 1M and 2M lasers the extended NOHD (ENOH).D).		N/A
	f) information for the selection of eye protection.		P
	g) reproduction of all required labels and warnings.		P
	h) location of laser apertures		P
	i) list of controls, adjustments of procedures for operation and maintenance - and warning statement.		P
	j) information (compatibility requirements) about laser energy source if not incorporated.		N/A
	k) additional warning for Class 1, 1M, 2, 2M, and 3R regarding skin or corneal burns.		N/A
	l) Information for Class 1C products (e.g. warning that repeated application may pose a risk).		N/A
8.2	Purchasing and service information		N/A
	a) safety classification of each laser product stated in all descriptive material (e.g. brochures).		N/A
	b) adequate instructions for servicing available: <ul style="list-style-type: none"> warnings and precautions regarding exposure of laser emission above Class 1 maintenance schedule list of controls and procedures that could increase accessible emissions description of displaceable parts protective procedures for service personnel reproduction of labels and hazard warnings 		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
9	ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS		
9.1	Applicable other parts of the standard series IEC 60825		—
	IEC 60825-2 (Safety of optical communication systems)		N/A
	IEC 60825-4 (Laser guards)		N/A
	IEC 60825-12 (Safety of free space optical communication systems used for transmission of information)		N/A
9.2	Medical laser products: Class 3B and Class 4 medical laser products comply with IEC 60601-2-22		N/A
9.3	Laser processing machines: Comply with IEC/ISO 11553 series.		N/A
9.4	Electric toys: Comply with IEC 62115		N/A
9.5	Consumer electronic products: Comply with IEC 60950 (IT-equipment) or IEC 60065 (AV equipment)		N/A
	Consumer laser products shall comply with applicable requirements for laser products of their class as well as with EN 50689. (For EN 60825-1/A11:2021)		N/A
	In addition, these products may be subject to specific safety standards such as EN 62368-1 (AV/ICT equipment). (For EN 60825-1/A11:2021)		N/A
	Products that are classified as Class 1C need to comply with the requirements of the respective specific vertical standard of the EN 60335 series or the EN 60601 series. (For EN 60825-1/A11:2021)		N/A



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Test Report

Report No.: GZEE240700313831

Date: 2025-02-21

Annex 1: Required labelling and information for user manual

The artwork below may be only a draft, and it shall be on marking plate:



Manufacturers of laser products shall be provided below following information on user manual:

- Adequate instructions for proper assembly, maintenance, and safe use, including clear warnings concerning precautions to avoid possible exposure to hazardous laser radiation and description of the classification limitations
- Maximum laser radiation output: 1500 W / 1 mW
Wavelength: 1080 nm / 650 nm
EN 60825-1:2014+A11:2021
- Safety instruction for embedded laser products and other incorporated laser products.
- Information for the selection of eye protection
- Reproduction of all required labels and warnings.
- A clear indication in the manual of all locations of laser apertures through laser radiation
- List of controls, adjustments of procedures for operation and maintenance - and warning statement
Caution – “Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.”



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Date: 2025-02-21

Annex 2: Photo documentation

Details of: View for model D70P

View:

- ☒ general
- ☐ front
- ☐ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



Details of: View for model D70P

View:

- ☐ general
- ☐ front
- ☐ rear
- ☒ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



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Details of: View for model D70P

View:

- ☐ general
- ☐ front
- ☒ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



Details of: View for output len

View:

- ☒ general
- ☐ front
- ☐ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



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Details of: View for laser aperture

View:

- ☒ general
- ☐ front
- ☐ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



Details of: View for connectors to link for control

View:

- ☐ general
- ☐ front
- ☒ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



--- END OF REPORT ---



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