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1

UL 62841-3-1000

**Outline of Investigation for Electric Motor-Operated Hand-Held Tools,
Transportable Tools And Lawn And Garden Machinery – Safety – Part
3-1000: Particular Requirements For Transportable Laser Engravers**

Issue Number: 1

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Summary of Topics

The First Issue of the Outline of Investigation for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-1000: Particular Requirements For Transportable Laser Engravers, which covers transportable CO₂ laser engravers with a laser power not exceeding 60 watts intended to engrave, ablate, burn, color, cut and perform similar processes on material samples inserted into the equipment.

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CONTENTS

1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 General requirements	5
5 General conditions for the tests	5
6 Radiation, toxicity and similar hazards	5
7 Classification	5
8 Marking and instructions	5
9 Protection against access to live parts	10
10 Starting	10
11 Input and current	10
12 Heating	10
13 Resistance to heat and fire	10
13.101 Fire containment	10
14 Moisture resistance	12
15 Resistance to rusting	12
16 Overload protection of transformers and associated circuits	13
17 Endurance	13
18 Abnormal operation	13
19 Mechanical hazards	13
20 Mechanical strength	14
21 Construction	15
22 Internal wiring	16
23 Components	16
24 Supply connection and external flexible cords	16
25 Terminals for external conductors	16
26 Provision for earthing	16
27 Screws and connections	16
28 Creepage distances, clearances and distances through insulation	16

Annexes

Bibliography

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Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 3-1000: Particular Requirements For Transportable Laser Engravers

This standard is to be used in conjunction with the First edition of UL 62841-1.

This standard, where stated, amends the requirements of UL 62841-1. Where a particular subclause of UL 62841-1 is not mentioned in UL 62841-3-1000, the UL 62841-1 subclause applies.

1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This part of UL 62841 applies to transportable CO₂ **laser engravers** with a laser power not exceeding 60 watts intended to cut, incise a design, engrave, ablate, burn, color, and perform similar processes on material samples inserted into the equipment.

This standard does not apply to fiber **laser engravers** and **laser engravers** intended for industrial use.

2 Normative references

This clause of Part 1 is applicable, except as follows:

Addition:

IEC 60695-11-20:1999

Fire hazard testing – Part 11-20: Test flames 500 W flame test methods

(CFR) Title 21, Part 1040

US Code of Federal Regulations

3 Terms and definitions

This clause of Part 1 is applicable, except as follows:

3.101 **air assist**: a constant stream of compressed air across the engraving or cutting surface at the point of burn to remove heat and combustible gases from the surface of the material and helps prevent the formation of flames.

3.102 **exhaust system**: a method of removing laser out-gas fumes and odours by a ventilation system connected to the **laser engraver**

3.103 **laser engraver**: tool employing a high intensity beam of light that is intended to cut, incise a design, engrave, ablate, burn, color, and perform similar processes on a variety of material inserted into the equipment.

4 General requirements

This clause of UL 62841-1 is applicable.

5 General conditions for the tests

This clause of UL 62841-1 is applicable, except as follows:

5.17 Addition:

*The mass of the **laser engraver** shall include any additional parts such as leg sets or carrying means that are required in accordance with the user instructions.*

6 Radiation, toxicity and similar hazards

This clause of UL 62841-1 is applicable, except as follows:

6.101 Laser

The tool employing a laser intended to cut, incise a design, engrave, ablate, burn, color, and perform similar processes on a variety of material inserted into the equipment shall comply with Code of Federal Regulations (CFR), Title 21, Part 1040.

7 Classification

This clause of UL 62841-1 is applicable:

8 Marking and instructions

This clause of UL 62841-1 is applicable, except as follows:

8.2 Addition:

Laser engravers shall be marked with safety information which shall be written in one of the official languages of the country in which the **laser engraver** is to be sold or marked with the appropriate symbol.

For all **laser engravers**:

“ **WARNING** – Fire hazard. Never operate the laser system unattended. Combustible materials exposed to the laser beam may ignite.”

“ **WARNING** – Do not operate the machine without proper operating exhaust system.”

The WARNING markings shall be readily visible to the user and shall not be located on the underside of the machine.

8.14.1.1 Replacement:

8.14.1.1 General safety warnings

NOTE The term "laser engraver" can be substituted by "laser cutter" in the safety warnings.

⚠ WARNING Read all safety warnings, instructions, illustrations and specifications provided with this laser engraver. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

1) Work area safety

- a) **Keep work area clean and well lit.** *Cluttered or dark areas invite accidents.*
- b) **Do not operate laser engraver in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** *Laser beam may ignite the dust or fumes.*
- c) **Set up and operate the laser engraver in a well-ventilated area. Place laser engraver on flat nonflammable surface and away from flammable material. Provide at least 8 inches of unobstructed spacing around laser engraver to allow ventilation.** *Laser engravers may create fumes that irritate eyes and airways. Obstructing airflow into or out of laser engraver may result in serious personal injury.*
- d) **Always use a properly configured, installed, maintained, and operating fume/smoke exhaust system as recommended by the manufacturer when operating the laser engraver.** *Caustic fumes and smoke from the cutting and engraving process must be extracted from the laser system and exhausted outside or properly filtered to reduce the risk of personal injury.*
- e) **Always keep a properly maintained and inspected fire extinguisher in the area.** *Typically, Carbon Dioxide (CO₂) chemical fire extinguishers should be used.*
- f) **Laser engravers must be operated only by persons familiar with their operation and manufacturer's instructions.** *Operation of laser cutters by persons unfamiliar with their operation and manufacturer's instructions can result in electric shock, fire and/or serious injury.*
- g) **Do not allow unsupervised children and bystanders to interact with the laser engraver while it is operating.** *Persons unfamiliar with the operation of the laser engraver may change its setup, which may increase the risk of electric shock, fire and/or serious injury.*

2) Electrical safety

- a) **Laser engraver plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) laser engravers.** *Unmodified plugs and matching outlets will reduce risk of electric shock.*

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- b) **While operating the laser engraver, avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators.** *There is an increased risk of electric shock if your body is earthed or grounded.*
- c) **Do not expose laser engravers to rain or wet conditions.** *Water entering a laser engraver may increase the risk of electric shock.*
- d) **Before every operation of a water-cooled laser engraver, make sure that the coolant connections and laser tube are leak-free.** *Water leaks may increase the risk of electric shock.*
- e) **Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the laser engraver. Keep cord away from heat, oil, sharp edges or moving parts.** *Damaged or entangled cords increase the risk of electric shock.*
- f) **Do not operate laser engravers in damp locations.** *Use of laser engravers in damp locations may increase the risk of electric shock.*

3) Personal safety

- a) **Stay alert, watch what you are doing and use common sense when operating a laser engraver. Do not use laser engraver while you are tired or under the influence of drugs, alcohol or medication.** *A moment of inattention while operating laser engravers may result in serious personal injury.*
- b) **Use personal protective equipment. Always wear eye protection appropriate for class of laser engraver.** *Protective equipment such as heat and cut resistant gloves used when work pieces are hot or have sharp edges will reduce personal injuries.*
- c) **Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts.** *Loose clothes, jewelry or long hair can be caught in moving parts.*
- d) **Be careful removing work pieces from the laser cutter. Cutting with a laser increases the temperature of the work piece and the temperature of the work piece may remain high after laser cutter stops operating.** *Touching hot work pieces before they cool down may result in burns.*
- e) **Do not let familiarity gained from frequent use of laser engravers allow you to become complacent and ignore laser engraver safety principles.** *A careless action can cause severe injury within a fraction of a second.*

4) Laser engraver use and care

- a) **Prevent idle laser engraver from being used by children and do not allow persons unfamiliar with the laser engraver or these instructions to operate the laser engraver.** *Laser engravers can be dangerous in the hands of untrained users.*
- b) **Maintain laser engravers. Check for misalignment or binding of moving parts, breakage of parts, coolant leaks and any other condition that may affect the laser engraver's operation. If damaged, have the laser engraver repaired before use. A poorly maintained laser engraver may result in a risk of shock, fire and/or serious injury.**