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SUBJECT 2565

OUTLINE OF INVESTIGATION

FOR

Manual and Semiautomatic Metal Sawing Machines

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Summary of Topics

This is the first issue of the Outline of Investigation for Manual and Semiautomatic Metal Sawing Machines, which covers manual and semiautomatic metal sawing machines that use a saw blade (tool) to cut off or change the shape of the work piece and are intended for use in industrial or commercial applications. Machines are manually operated or capable of performing one cutting cycle of operation, which is manually actuated.

The UL Foreword is no longer located within the UL outline of investigation. For information concerning the use and application of the requirements contained in this outline of investigation, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net/ulforeword.html>

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CONTENTS

INTRODUCTION

1 Scope	5
2 Components	6
3 Units of Measurement	6
4 Undated References	6
5 Glossary	6

CONSTRUCTION

6 Spacings	7
7 Devices	7
8 Strain Relief	7
9 Grounding	8
9.1 General	8
9.2 Grounding means	8
10 Printed-Wiring Boards	8
11 Transformers	9
12 Capacitors, Capristors and Varistors	9
12.1 General	9
12.2 Isolating components	9
12.3 Across-the-line components	10
13 Parts Subject to Pressure	10
14 Pressure-Relief Devices	10

PERFORMANCE

15 General	11
16 Power Input Test	11
17 Temperature Test	11
18 Dielectric Voltage-Withstand Test	14
18.1 General	14
18.2 Secondary circuits (controlled environment) test	15
18.3 Power transformer test	16
19 Overvoltage and Undervoltage Tests	16
20 Use with Water Test	17
21 Single Phasing Test	17
22 Fan Locked Rotor Test	18
23 Blocked Filter Test	18
24 Drive Motor Locked Rotor Test	18
25 Emergency Stop Operation Test	19
26 Breakdown of Components Test	19
27 Power Loss and Power Restoration Test	19
28 Strain Relief Test	19
29 Push-Back Strain Relief Test	20
30 Resistance of Grounding Path Test	20
31 Flexing Test	20
32 Physical Stability Test	21
33 Lifting/Transportation Means Loading Test	21
34 Parts Subject to Pressure Tests	21

35 Pressure-Relief Devices Test	22
36 Securement of Snap-On Cover Test	23
37 Wheel or Caster Securement Test	23
38 Component Analysis Test	23
38.1 General	23
38.2 Evaluation program	24
39 Safety-Related Software Analysis	25

MARKING

40 General	25
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APPENDIX A

Standards for Components.....	A1
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INTRODUCTION

1 Scope

1.1 This outline of investigation covers manual and semi-automatic metal sawing machines that use a saw blade (tool) to cut off or change the shape of the work piece and are intended for use in industrial or commercial applications. Machines are manually operated or capable of performing one cutting cycle of operation, which is manually actuated.

1.2 This equipment is intended to be installed in accordance with the National Electrical Code, ANSI/NFPA 70 and Electrical Standard for Industrial Machinery, ANSI/NFPA 79.

1.3 Machines included in this category are not intended for the handling of hazardous material.

1.4 The use of some equipment involves certain inherent hazards related to the risk of injury that cannot be wholly eliminated by practical design features. These requirements are intended to reduce such hazards to an acceptable level.

1.5 This outline of investigation does not cover:

- a) Robotics and associated control equipment. This equipment is covered by the Standard for Robotic Equipment, UL 1740.
- b) Automated equipment designed to perform repetitive manufacturing related cutting or sawing tasks, is covered by the Outline of Investigation for Automation Equipment, Subject 2011.
- c) Cord-connected or permanently-connected stationary and light industrial tools which are covered under Standard for Stationary and Fixed Electric Tools, UL 987.

1.6 Devices covered by this outline of investigation are not intended for the handling of hazardous materials in unattended applications.

1.7 In addition to complying with the requirements in this outline of investigation, manual and semi-automatic metal sawing machines shall also comply with:

- a) Standard for Machine Tools – Safety for Metal Sawing Machines, ANSI B11.10,
- b) Standard for Electrical Standard for Industrial Machinery, ANSI/NFPA 79, and
- c) The applicable requirements in the Standard for Stationary and Fixed Electric Tools, UL 987.

1.8 A control panel which forms a portion of the overall equipment, either alone or in conjunction with the metal sawing machine, shall comply with the requirements in the Standard for Industrial Control Panels, UL 508A.

2 Components

2.1 Except as specified in 2.2 and 7.1, a component of a product covered by this outline of investigation shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this outline of investigation.

2.2 A component need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed in the application of the component in the product covered by this outline of investigation, or
- b) Is superseded by a requirement in this outline of investigation.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this outline of investigation shall be interpreted as referring to the latest edition of that code or standard.

5 Glossary

5.1 CLASS 2 CIRCUIT – An isolated secondary circuit involving a potential of not more than 30 V (42.4 V peak) supplied by:

- a) An inherently-limited Class 2 transformer,
- b) A combination of an isolated transformer secondary winding and a fixed impedance or regulating network that together comply with the performance requirements for an inherently limited Class 2 transformer,
- c) A dry-cell battery having output characteristics not greater than those of an inherently-limited Class 2 transformer,
- d) Any combination of (a), (b), and (c) above that together comply with the performance requirements for an inherently-limited Class 2 transformer, or
- e) One or more combinations of a Class 2 transformer and an overcurrent protective device that together comply with the performance requirements for a noninherently-limited Class 2 transformer.

A line-connected circuit connected in series with an impedance as a means of limiting the voltage and current is not a Class 2 circuit.

5.2 CONTROLLED ENVIRONMENT – An environment relatively free of contaminants. A controlled environment may also be provided by means of a NEMA Type 4, 12 or 13 enclosure as specified in the Standard for Industrial Control Equipment, UL 508.

CONSTRUCTION

6 Spacings

6.1 The electrical spacings in a metal sawing machine shall comply with the spacings requirements in the Standard for Industrial Control Equipment, UL 508.

6.2 The electrical spacings for a device or subassembly which is contained within the overall equipment shall comply with the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840.

7 Devices

7.1 As specified in 2.1, all devices employed in a metal sawing machine shall comply with the requirements for that component.

Exception No. 1: A non-electrical, non-hydraulic device such as one operating on air pressure is not required to be evaluated.

Exception No. 2: An electrical device operating entirely within a Class 2 Circuit is not required to be evaluated unless the device performs a safety function.

8 Strain Relief

8.1 A metal sawing machine shall be provided with strain relief so that mechanical stress on a supply cord will not be transmitted to terminals, splices, or interior wiring.

8.2 A strain-relief device shall be subjected to the Strain Relief Test, Section 28.

8.3 Means shall be provided to prevent a flexible cord or interconnecting cable from being pushed into a machine through a cord-entry hole if such displacement results in:

- a) Subjecting the supply cord or interconnecting cable to mechanical damage,
- b) Exposing the supply cord or interconnecting cable to a temperature higher than that for which it is rated,
- c) Reducing spacings, or
- d) Damaging internal connections or components.

8.4 To determine compliance, the supply cord or interconnecting cable shall be tested in accordance with the Push-Back Strain Relief Test, Section 29.

9 Grounding

9.1 General

9.1.1 There shall be provision for grounding the metal sawing machine and all dead metal parts that are exposed or that are likely to be touched by a person during normal operation or adjustment, and that are likely to become energized through electrical malfunction.

9.1.2 To determine whether a part is likely to become energized, such factors as construction, the proximity of wiring, and a dielectric voltage-withstand test conducted after appropriate overload, endurance, and burnout tests are to be evaluated.

9.1.3 A metal sawing machine shall comply with the Grounding Resistance Test, Section 30.

9.2 Grounding means

9.2.1 An equipment-grounding terminal or lead-grounding point shall be connected to the frame or enclosure by a positive means, such as by a bolted or screwed connection.

9.2.2 Nonconductive coatings, such as paint, lacquer, and enamel shall be removed from the grounding surface area to assure electrical continuity, or the grounding connection shall reliably penetrate the nonconductive coating.

9.2.3 A grounding point shall be located so that it is unlikely that the grounding means will be removed during normal servicing.

9.2.4 The following are acceptable means for electrically grounding permanently connected equipment:

- a) An equipment-grounding terminal or lead intended to be connected to a nonmetal-enclosed wiring system, for example, a nonmetallic-sheathed cable.
- b) A knockout or equivalent opening in a metal enclosure intended to be connected to a metal enclosed wiring system.

10 Printed-Wiring Boards

10.1 A printed-wiring board shall comply with the Standard for Printed-Wiring Boards, UL 796.

10.2 A printed-wiring board containing circuits involving a risk of fire or electric shock shall be rated at least V-2 as specified in requirements for tests for flammability of plastic materials for parts in devices and appliances, Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. Printed-wiring boards not involving a risk of fire or electric shock may be rated HB.

10.3 The laminate material in a printed-wiring board used in a circuit that involves a risk of fire or electric shock shall comply with the direct support of current-carrying parts performance level requirements specified in the Standard for Printed-Wiring Boards, UL 796, and be marked with:

- a) "▲", or
- b) Have a unique type designation that is limited to such printed-wiring boards to indicate compliance with the direct support requirements of UL 796.

10.4 A conformal coating employed on the surface of a printed-wiring board intended to be used for the acceptance of reduced spacings may be acceptable if it complies with Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

11 Transformers

11.1 A Class 2 transformer used as a supply for a Class 2 circuit shall comply with the Standard for Low Voltage Transformers - Part 3: Class 2 and Class 3 Transformers, UL 5085-3.

11.2 A power transformer shall comply with the Power Transformer Test, Section 18.3.

11.3 A transformer shall comply with the applicable performance requirements outlined in this outline of investigation, including the temperature and dielectric voltage-withstand tests.

12 Capacitors, Capristors and Varistors

12.1 General

12.1.1 A component such as a capacitor, a combination capacitor and resistor, varistor or a suppressor shall employ materials and shall be constructed so that a risk of fire is not introduced. The component shall not be adversely affected by the temperature it reaches under the most severe conditions of use.

12.1.2 Under both normal and abnormal conditions of use, a component as described in 12.1.1, employing a liquid dielectric medium more combustible than askarel shall not result in a risk of fire or electric shock, and shall be constructed to reduce the risk of expelling the dielectric medium.

12.1.3 A capacitor complying with the requirements for protected oil-filled capacitors in the Standard for Capacitors, UL 810, is considered to be protected against the expulsion of the dielectric medium.

12.2 Isolating components

12.2.1 A component, such as a capacitor, a combination capacitor and resistor, or a suppressor used for lineby- pass, or metal-cabinet isolation; or between supply-circuit (line) connected parts and exposed metal parts (where the component is continually stressed) shall comply with the requirements in the Standard for Capacitors and Suppressors for Radio- and Television-Type Appliances, UL 1414.