

**Underwriters Laboratories Inc.®**A not-for-profit organization dedicated to public safety
and committed to quality service**April 19, 1996****Revision pages for****Standard for****Marine Blowers****UL 1128, Second Edition**

Attached to this transmittal notice is a revision of the Second edition of UL 1128.

A CHANGE ON A PAGE DATED APRIL 19, 1996 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THE FOLLOWING REVISIONS ARE CONSIDERED NON-SUBSTANTIVE AND WERE ISSUED TO ELIMINATE THE OXYGEN BOMB TEST. THE OXYGEN BOMB TEST IS NO LONGER APPROPRIATE IN MOST CASES DUE TO THE ADDITION OF ANTIOXIDANTS TO RUBBER AND POLYMERIC COMPOUNDS. THEREFORE, UL IS ELIMINATING THE OXYGEN BOMB TEST AND REPLACING IT WITH AN AIR OVEN AGING TEST WHICH IS USED FOR THERMOPLASTIC COMPOUNDS. THE REQUIREMENTS ARE NOW IN EFFECT.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 1128-1988.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the following checklist:

Page	Date
1	September 29, 1988 (Reprinted April 19, 1996)
2	September 29, 1988
3	January 17, 1992
4 — 7	September 29, 1988
8	January 17, 1992
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15	April 19, 1996
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UL 1128

Standard for

Marine Blowers

First Edition — August, 1977

Second Edition

September 29, 1988

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated September 29, 1988. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI/UL 1128-1988, April 7, 1988

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

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Immersion Test

27.1 A synthetic-rubber or elastomeric material (1) that forms part of an ignition-protected blower or (2) the deterioration of which would impair the intended operation of the blower, shall not have a volume change of more than 50 percent swelling or a loss in tensile strength of more than 40 percent, when tested as described in paragraphs 27.2—27.4.

27.2 The tensile-strength test may be conducted on die-cut specimens or on samples of the finished product as appropriate.

27.3 Two sets of specimens or samples are to be immersed in test fuels at $23 \pm 2^\circ\text{C}$ ($73 \pm 4^\circ\text{F}$) for 5 hours; one set in ASTM Reference Oil No. 3, and another set in ASTM Reference Fuel C. The composition of the test liquids is to be as specified in the Standard Test Method for Rubber Property — Effect of Liquids, ANSI/ASTM D471 — 79.

27.4 The samples are then to be removed, blotted dry, and judged with respect to unconditioned samples.

Aging Test

27.5 A part made of synthetic rubber that is able to be affected by aging shall not crack or show visible evidence of deterioration such as cracking, discoloration, shrinking, swelling, melting, or warping following exposure in an air oven for 10 hours at $100 \pm 2^\circ\text{C}$ ($212 \pm 306^\circ\text{F}$).

Paragraph 27.5 revised April 19, 1996

Mold Stress Test on Moving Parts

27.6 A blower having a moving part formed of polymeric material shall be exposed to air at 70°C (158°F) for 7 hours while in its normal operating position. After the sample has cooled to room temperature, the probe illustrated in Figure 4.1 shall not contact a portion of the blade or blower wheel that involves a risk of injury to persons. The probe is to be applied as described in item B of paragraph 4.8.

28. Permanence of Marking Test

28.1 A pressure-sensitive label, or a label secured by adhesive or cement, shall comply with the requirements for indoor use labels where exposed to high humidity or occasional exposure to water as specified in the Standard for Marking and Labeling Systems, UL 969. Following each of the specified exposures, the label shall not be removable intact. The circulating air-oven exposure described in UL 969 is to be conducted at a temperature of 87°C (189°F).

RATING

29. General

29.1 A blower shall be rated in (1) volts and (2) amperes or watts, or both.

MARKING

30. General

30.1 Blowers shall be permanently and legibly marked with the following:

- A. Manufacturer's or private labeler's name or identifying symbol,
- B. Model, type, or catalog designation,
- C. Date of manufacture (may be in code), and
- D. Electrical rating in (1) nominal supply voltage and (2) amperes or watts, or both.

30.2 A blower, switch, or other accessory complying with the ignition protection requirements shall be marked "Ignition Protected" or the equivalent.

30.3 A blower, switch, or other accessory not complying with the ignition-protection requirements shall be marked with the word "CAUTION" and with the following or an equivalent statement: "Potential Ignition Source. Do Not Install in Areas Requiring Ignition Protection."

30.4 A separate controller or switch for a blower (a controller or switch that is not physically a part of the blower) shall be marked with:

A. The name or identifying symbol of the manufacturer,

B. The manufacturer's catalog number or equivalent designation, unless the marking indicates specifically, by means of the manufacturer's name or trademark and by means of a catalog designation or the equivalent, the blower or blowers with which it is intended to be used, and

C. The ignition-protection markings specified in paragraph 30.2 or 30.3.

30.5 A required marking shall be located so as to be visible after the blower is installed as intended.

30.6 A required marking shall be stamped, cast, or molded into the blower or a labeling plate. A plate shall (1) be constructed of metal or of the same material as the outer panels of the blower and riveted, bolted, or screwed to the blower or (2) comply with the requirements in Permanence of Marking Test, Section 28.

INSTALLATION AND OPERATING INSTRUCTIONS

31. General

31.1 The manufacturer shall provide complete installation and operating instructions for a blower. The instructions shall include at least the following:

A. Manufacturer's or private labeler's name;

B. Model number of the blower;

C. Electrical ratings in (1) nominal supply voltage, and (2) amperes or watts, or both;

D. Mounting instructions;

E. A curve or chart showing the blower rating in cubic feet per minute at various static pressures when operating at rated voltage, except that a ventilating blower for galley or cabin areas and not intended to be connected to ducting system may have a single point of rating at zero static pressure and rated voltage;

F. Dimensional information relative to the intake and exhaust duct connections, and recommended method of connection to a duct system; and

G. Recommended overcurrent protection.

31.2 A separate placard containing user operating instructions, safety precautions, or warnings for a blower shall have the markings printed in 1/8-inch (3.2-mm) or larger letters. These placards shall be acceptable for posting and shall accompany each blower.



Underwriters Laboratories Inc.®

An independent, not-for-profit organization testing for public safety

January 17, 1992

Revision pages for

STANDARD FOR

MARINE BLOWERS

UL 1128, SECOND EDITION

Attached to this transmittal notice is a revision of the second edition of UL 1128.

A CHANGE IN REQUIREMENTS IS INDICATED BY A VERTICAL LINE IN THE MARGIN ON PAGES DATED JANUARY 17, 1992. EDITORIAL CHANGES ARE NOT SO MARKED.

THESE NEW AND REVISED REQUIREMENTS ARE NOW IN EFFECT.

The new and revised requirements are substantially in accordance with UL's bulletin on this subject dated August 2, 1991. The bulletin is now obsolete and may be discarded.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 1128-1988.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

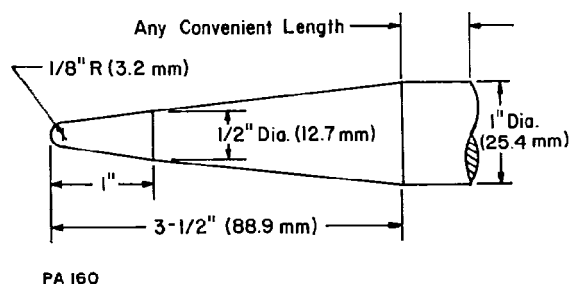
B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

FIGURE 4.1
PROBE

4.9 A guard relied upon for compliance with the requirement in item B of paragraph 4.8 shall be attached to a blower as follows:

- A. Permanently;
- B. By means requiring the use of a tool for removal; and
- C. By means not requiring the use of a tool for removal, provided that either of the following is required to disengage the securing means:
 1. Two separate motions, such as push and turn; or
 2. A force of 5 pounds (22.2 N).

4.10 The removal force specified in item C of paragraph 4.9 is to be measured after conditioning the securing means by removing the guard and replacing it ten times in the intended manner.

5. Materials

5.1 A synthetic rubber or other nonmetallic material, or finish coating, that is exposed to the air flow or used for the housing shall be resistant to deterioration from exposure to gasoline, fuel oil, kerosene, and salt water. See Polymeric Materials Tests, Section 27.

6. Protection Against Corrosion

6.1 An iron or steel part shall be protected against corrosion by enameling, galvanizing, zinc or cadmium plating, or other equivalent means. See Salt Spray Corrosion Test, Section 26.

Exception No. 1: This requirement does not apply to bearings or laminations, or to parts, such as machine screws and washers, that are not necessary for the blower to perform its intended function or are enclosed within the blower or motor.

Exception No. 2: Phosphate treatment with an oil or wax coating is acceptable as corrosion protection for magnets and armatures; oil treatment is acceptable as corrosion protection for steel springs; and stainless steel is acceptable without additional protection, if properly polished or treated.

6.2 A rotating part shall be formed of material having resistance to corrosion at least equivalent to AISI Type 410 stainless steel alloy and shall be galvanically compatible with other metallic parts of the blower. A part formed of materials not known to provide acceptable resistance to corrosion and dezincification and acceptable galvanic compatibility is to be subjected to the Salt Spray Corrosion Test, Section 26.

7. Current-Carrying Parts

7.1 A current-carrying part shall be silver, copper, a copper alloy, or other metal acceptable for the particular application in a marine environment.

7.2 Ordinary iron or steel provided with a corrosion-resistant coating in accordance with paragraph 6.1 or stainless steel may be used for a current-carrying part within a motor or associated governor. The use of iron and steel is not acceptable for a current-carrying part elsewhere in a blower.

8. Wiring

8.1 A blower shall be of the two conductor type, with power and return conductors insulated from the housing.

Paragraph 8.1 revised January 17, 1992

8.2 Wiring and connections between parts shall be mechanically protected or enclosed.

Exception: A flexible cord need not be enclosed.

8.3 Conductors other than short internal jumpers and those in wound coils shall be stranded copper.

8.4 Wires within an enclosure, compartment, raceway, or the like shall be located or protected to reduce the likelihood of contact with any sharp edge, burr, fin, moving part, or the like that may abrade the insulation on conductors or otherwise damage wires.

8.5 A hole in a wall or partition through which wire or cord passes, or on which wire or cord may bear within the overall enclosure of the blower, shall be provided with a smooth rounded bushing or the hole shall have a smooth rounded surface to reduce the risk of abrasion of the insulation.

8.6 Internal wiring shall have insulation rated for the potential and temperature to which it may be subjected, and shall be a minimum of No. 18 AWG (0.82 mm²). Insulated wire employed for internal wiring shall be stranded copper conductor marine wire or stranded copper conductor appliance wiring material rated for use in moist or wet locations.

8.7 Where stranded internal wiring is connected to a wire-binding screw, loose strands of wire shall be prevented from contacting other uninsulated live parts and dead metal parts. This may be accomplished by the use of pressure terminal connectors, soldering lugs, crimped eyelets, soldering all strands of the wire together, or other equivalent means.

9. Field-Wiring Connections

9.1 A blower shall be provided with (1) field-wiring terminals for connection of power supply conductors corresponding to the marked rating of the blower, or (2) except as noted in paragraph 9.2, pigtail connections (leads or flexible cord) that are a minimum of 6 inches (152 mm) long.

9.2 For a combination pump and blower, a pigtail connection shall be a minimum of 16 inches (406 mm) long.

9.3 If flexible cord is used, it shall be Type SJO, SJT, SJTO, SO, ST, or STO.

9.4 Terminals shall be located or enclosed to reduce the likelihood of accumulation of water between terminals of opposite polarity and between the terminals and ground.

9.5 Conductors shall be acceptable for the maximum electrical load anticipated in service and shall be at least No. 16 AWG (1.3 mm²) or larger if single and No. 18 AWG (0.82 mm²) or larger if in a multiconductor sheath in accordance with one of the following types:

A. A stranded copper conductor that has insulation complying with the moisture resistance and flame retardance requirements in Article 310 of the National Electrical Code, ANSI/NFPA 70.

B. Cables for Boats, UL 1426.

C. A stranded copper conductor that complies with the insulating material temperature rating requirements in the Recommended Practice for Marine Engine Wiring, SAE J378c (June 1978).

D. A flexible cord type SO, STO, ST, SJO, SJT, or SJTO.

Paragraph 9.5 revised January 17, 1992

9.6 An exposed metallic part of a blower shall have provision for connecting a bonding conductor unless the exposed part is acceptably isolated from all current-carrying parts by independent insulation provided in addition to the basic insulation. See Stray Current Leakage Test, Section 20.

**Replaces page 8 dated September 29, 1988*

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18.4 The sample is to be mounted so that the center of gravity of the sample is as close as possible to the geometric center of the machine platform.

19. Temperature Tests

Low Temperature Test

19.1 There shall be no evidence of cracking or deterioration that could impair intended operation when a blower is subjected to the test described in paragraphs 19.2 and 19.3.

19.2 The sample is to be placed in a cold chamber maintained at minus $30 \pm 3^{\circ}\text{C}$ (minus $22 \pm 5^{\circ}\text{F}$) for 24 hours. At the end of the 24 hours, single conductor wiring subject to flexing in intended use is to be wrapped 360 degrees around a mandrel of the size specified in Table 19.1, first in one direction and then the other. Sheathed multiconductor cables are to be wrapped around a mandrel of the size specified in Table 19.2 for the number of turns specified in Table 19.2, first in one direction and then the other. These tests are to be done prior to removal of the test sample from the cold chamber.

TABLE 19.1
MANDREL DIAMETERS — SINGLE CONDUCTORS

Wire Size		Mandrel Diameter	
AWG	(mm ²)	Inches	(mm)
16	1.3	0.313	7.95
14	2.1	0.313	7.95
12	3.3	0.375	9.53
10	5.3	0.563	14.30
8	8.4	0.688	17.48
6	13.3	1.250	31.75
4	21.2	1.375	34.93
2	33.6	1.563	39.70
1	42.4	2.688	68.28

TABLE 19.2
MANDREL DIAMETERS AND NUMBER OF
TURNS — SHEATHED MULTI-CONDUCTORS

Maximum Overall Diameter of Finished Round Cord or Length of Minor Axis of Flat Cord, Inch (mm)		Mandrel Diameter, Inch (mm)	Number of Complete Turns of Specimen Around Mandrel	
1/8	(3.2)	1/4	(6.4)	6
1/4	(6.4)	1/2	(12.7)	6
3/8	(9.5)	3/4	(19.1)	6
1/2	(12.7)	1	(25.4)	6
5/8	(15.9)	1-1/4	(31.8)	6
3/4	(19.1)	1-1/2	(38.1)	1
7/8	(22.2)	1-3/4	(44.5)	1
1	(25.4)	2	(50.8)	1

19.3 Following the cold exposure, the sample is to be subjected to 25 shock impacts as specified in the Shock Test, Section 18. The shock impacts are to be started within 30 seconds after removal from the cold chamber. If the transfer cannot be made in the time specified, the sample is to be wrapped in insulating material to prevent a temperature rise in excess of 5°C (9°F) before the initial impact.

High Temperature Test

19.4 When tested as described in paragraphs 19.5 — 19.7, the external temperature on a blower shall not exceed 150°C (302°F) at any time during the test, and there shall be no softening, swelling, nor deterioration that could impair intended operation of the blower.

19.5 The sample is to be placed in an oven maintained at $60 \pm ^{\circ}\text{C}$ ($140 \pm 9^{\circ}\text{F}$) and is to be operated continuously at 120 percent of nominal supply voltage until ultimate conditions occur, but not for more than 7 hours. For an impeller type blower, the intake and discharge ports are to be open and unrestricted. For an in-line blower, the test is to be conducted twice, once with the blower intake and discharge ports open and unrestricted, and once with the blower intake and discharge port closed with restricted ventilation. The discharge opening shall be at least 2 feet (0.6 m) from any surface for any product type. The same sample is to be used for the tests on in-line blowers. See paragraph 14.1.

Paragraph 19.5 revised January 17, 1992

**Replaces page 11 dated September 29, 1988*

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