UL 1129

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Wet Exhaust Components for Marine Engines

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Wet Exhaust Components for Marine Engines, UL 1129

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

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UL 1129

Standard for Wet Exhaust Components for Marine Engines

First Edition – August, 1976
Second Edition – March, 1988

Third Edition

September 1, 1999

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

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 set of revised requirements.

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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 which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this Standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, 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.

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INTRODUCTION

1 Scope

1.1 These requirements cover marine engine wet exhaust systems and components from the connection to the engine exhaust manifold to the hull discharge fitting.

1.2 The components covered by these requirements are intended for installation in accordance with the applicable requirements of the Standard for Fire Protection Pleasure and Commercial Motor Craft, NFPA 302.

1.3 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this standard is maintained. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard shall not be judged to comply with this standard. Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 Glossary

2.1 For the purpose of this standard, the following definitions apply.

2.2 EXHAUST SYSTEM – A means by which hot exhaust gases, discharged from an engine, are conducted to an outboard terminus and released to the atmosphere.

2.3 FLEXIBLE SECTION – A limber portion of an exhaust system installed to reduce the transmission of engine vibration and motion and to permit thermal expansion of the system.

2.4 SILENCER (MUFFLER) – A baffled chamber installed in an exhaust system for the purpose of noise attenuation.

2.5 WET EXHAUST – A system, or any portion thereof, that is cooled by water either injected directly into that part of the system through which the exhaust gases flow or circulated through a water-jacketed section that serves to isolate the cooling water from the exhaust-gas passage.

3 General

3.1 Units of measurement

3.1.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

3.2 Components

3.2.1 Except as indicated in 3.2.2, a component of a product covered by this standard shall comply with the requirements for that component.

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3.2.2 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 standard, or

b) Is superseded by a requirement in this standard.

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

3.2.4 Specific components are recognized as being 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 for which they have been recognized.

CONSTRUCTION

4 General

4.1 A material used for the fabrication of an exhaust system or component shall have the strength and rigidity necessary to withstand the temperatures, pressures, stresses, and corrosive conditions that may be imposed on the system in service without leakage, separation of plies, cracking, or other deterioration.

4.2 Combinations of metal and metal alloys shall be galvanically compatible.

4.3 A silencer or water-jacketed component shall have acceptable drain provisions. A drain plug of at least 1/8 inch pipe size shall be provided for this purpose.

Exception: A component need not be provided with a drain plug if it cannot accumulate a sufficient amount of water to be subject to a risk of structural damage if the water freezes.

4.4 An exhaust component shall be free of rough or sharp edges that may constitute a risk of injury to persons installing or servicing it or servicing nearby equipment.

PERFORMANCE

5 Vibration Test

5.1 An exhaust component shall withstand, without separation of plies, cracking, or other material deterioration, vibration for 24 hours in accordance with 5.5.

5.2 A sample of a component intended for direct connection to a pipe fitting or flange at the engine or a rigid fitting at the hull is to be secured directly to a rigid coupling on the vibration table test fixture. The sample is to be in the intended operating position, with the free end coupled to a second fixture that is off the table by means of marine exhaust hose having a minimum of 3 plies of cloth reinforcing and 1 ply of steel reinforcing. The flexible hose coupling is to be 4 feet (1.2 m) long. See Figure 5.1.

5.3 A sample of flexible exhaust hose is to be secured to an acceptable serrated hose coupling mounted on the vibration table test fixture, with the free end of the hose secured to a second hose coupling on a separate fixture that is off the table. The rigid test fixture then is to be positioned so that the sample is bent to a 45 degree angle at the minimum radius specified by the manufacturer.

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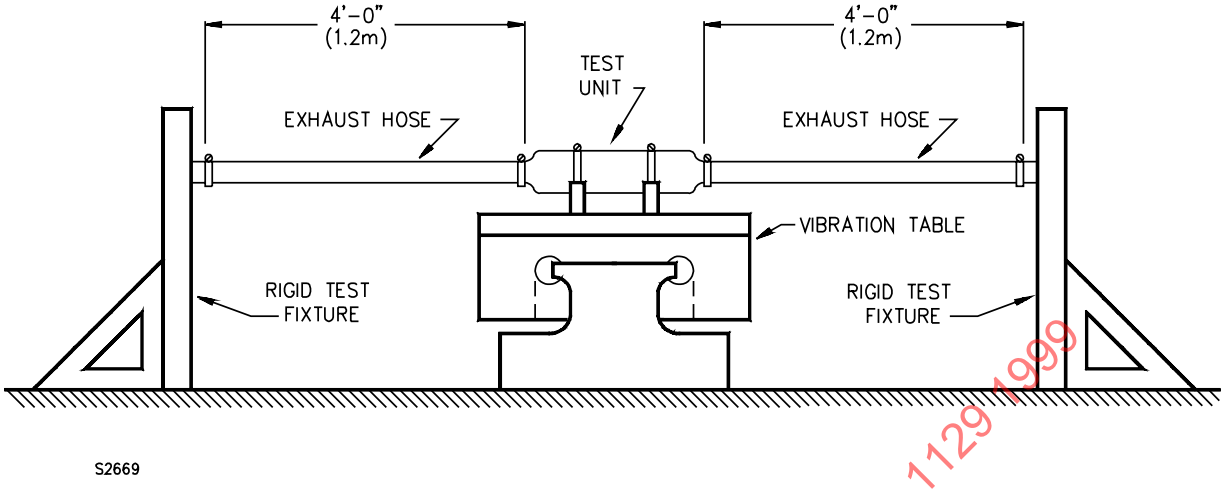
Figure 5.1
Typical test set up – Directly connected component



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5.4 A sample of a component intended to be independently supported between the engine and hull discharge (for example, a muffler or rigid exhaust tubing) is to be supported on the vibration table in a manner simulating a normal installation and is to be connected at both ends to rigid fixtures with a 4-foot (1.2-m) length of marine exhaust hose. See Figure 5.2.

5.5 The sample is to be subjected to a variable frequency vibration in each of three rectilinear axes (horizontal, lateral, and vertical) while mounted to a vibration table as specified in 5.2, 5.3, or 5.4, as applicable. The vibration is to be maintained for 8 hours in each plane at a peak-to-peak amplitude of 0.10 ±0.001 inch (0.25 ±0.03 mm). The frequency of vibration is to be continuously varied, at a uniform rate, from 10 to 60 to 10 hertz every 4 minutes.

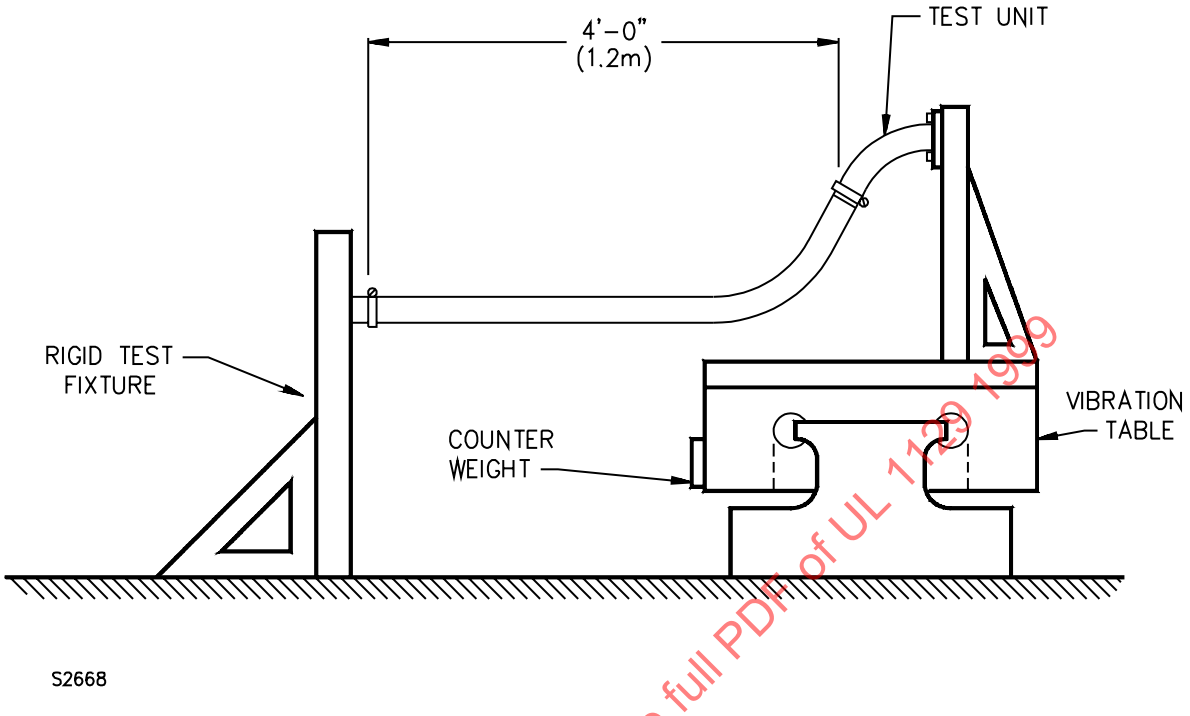
6 Shock Test

6.1 An exhaust component shall withstand, without separation of plies, cracking, or other material deterioration, 5000 shock impacts as described in 6.3.

6.2 The sample used in the Vibration Test, Section 5, is to be used for this test. The sample is to be mounted to a test fixture in accordance with 5.2, 5.3, or 5.4, as applicable, except that a 1 foot (305 mm) section of marine exhaust hose (see 5.2) is to be fastened to each free end of the sample by means of hose clamps. Each hose section is to be 18 inches (457 mm) above the shock platform with the sample mounted on the test fixture, and is not to be supported at the free end.

6.3 The assembly (sample, hose, and test fixture) is to be subjected to 5000 shock impacts, each having an acceleration of 10 g [322 feet per second per second (98 m/s^2)] and a duration of 20 – 25 milliseconds as measured at the base of the half-sine shock envelope.

Figure 5.2
Typical test set up – Independently supported component



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7 Bending Test

7.1 A component intended to provide flexibility to accommodate a permanent bend at the time of installation shall withstand the test described in 7.2. Nonmetallic tubing shall not pant or collapse. There shall be no separation of plies, cracking, or other material deterioration.

7.2 A sample is to be securely fixed at one end and the free end bent in one plane about the center line for 1000 consecutive bends at a rate of approximately 30 bends per minute. See Figure 7.1. Each bend is to consist of a movement from center line to a position 22-1/2 degrees above center line, then to a position 22-1/2 degrees below center line, and then back to center line.

7.3 Following the bending described in 7.2, the sample is to be bent to 45 degrees above, then 45 degrees below, the horizontal, and examined for kinking after each bend.

8 Static Pressure Test

8.1 Strength test

8.1.1 An exhaust component shall withstand for 5 minutes, without leakage, separation of plies, cracking, or other material deterioration, a gauge pressure of 25 psi (172 kPa).

8.1.2 A sample is to be filled with water, sealed, and gradually pressurized to 25 psig (172 kPa). The hydrostatic pressure is to be maintained for 5 minutes.