



UL 2021

STANDARD FOR SAFETY

Fixed and Location-Dedicated Electric Room Heaters

This is a preview. [Click here to purchase the full publication.](#)

UL Standard for Safety for Fixed and Location-Dedicated Electric Room Heaters, UL 2021

Fourth Edition, Dated September 30, 2015

Summary of Topics

This revision of ANSI/UL 2021 dated February 2, 2021 includes replacing the reference to the Standard for Power Conversion Equipment, UL 508C, with reference to the Standard for Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy, UL 61800-5-1; [3.3.4.1](#) and [21.4](#)

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal (s) on this subject dated November 6, 2020.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

No Text on This Page

SEPTEMBER 30, 2015
(Title Page Reprinted: February 2, 2021)



ANSI/UL 2021-2021

1

UL 2021

Standard for Fixed and Location-Dedicated Electric Room Heaters

First Edition – January, 1992
Second Edition – April, 1997
Third Edition – January, 2013

Fourth Edition

September 30, 2015

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through February 2, 2021.

The most recent designation of ANSI/UL 2021 as an American National Standard (ANSI) occurred on February 2, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

COPYRIGHT © 2021 UNDERWRITERS LABORATORIES INC.

This is a preview. [Click here to purchase the full publication.](#)

No Text on This Page

CONTENTS

INTRODUCTION

| | | |
|---|---|----|
| 1 | Scope | 7 |
| 2 | Glossary | 7 |
| 3 | Components | 9 |
| | 3.1 General | 9 |
| | 3.2 Attachment plugs, receptacles, connectors, and terminals | 10 |
| | 3.3 Controls | 11 |
| | 3.4 Cords, cables, and internal wiring | 13 |
| | 3.5 Film-coated wire (magnet wire) | 13 |
| | 3.6 Insulation systems | 13 |
| | 3.7 Printed wiring boards | 13 |
| | 3.8 Semiconductors and small electronic components | 14 |
| | 3.9 Supplemental insulation, insulating bushings, and assembly aids | 14 |
| | 3.10 Switches | 15 |
| | 3.11 Transformers | 16 |
| 4 | Units of Measurement | 16 |
| 5 | References | 16 |
| 6 | General | 16 |

CONSTRUCTION

| | | |
|----|---|----|
| 7 | Enclosure | 16 |
| 8 | Parts Subject to Pressure | 26 |
| 9 | Polymeric Materials | 27 |
| 10 | Assembly | 27 |
| 11 | Protection Against Corrosion | 28 |
| 12 | Adjustment Stop | 29 |
| 13 | Supply Connections | 29 |
| | 13.1 Permanently connected appliances | 29 |
| | 13.2 Cord-connected heaters | 32 |
| | 13.3 Strain relief | 38 |
| | 13.4 Pin terminals | 38 |
| | 13.5 Bushings | 39 |
| | 13.6 Pilot lights | 40 |
| 14 | Current-Carrying Parts | 41 |
| 15 | Internal Wiring | 41 |
| | 15.1 General | 41 |
| | 15.2 Protection of wiring | 41 |
| | 15.3 Splices | 42 |
| | 15.4 Separation of circuits | 43 |
| | 15.5 Barriers | 44 |
| 16 | Heating Elements | 44 |
| 17 | Electrical Insulation | 45 |
| 18 | Thermal Insulation | 45 |
| 19 | Motors | 45 |
| | 19.1 General | 45 |
| | 19.2 Insulation systems | 46 |
| 20 | Overcurrent Protection, General | 46 |
| 21 | Overcurrent Protection, Motors and Motor Circuits | 48 |
| 22 | Overcurrent Protection, High-Voltage Control Circuit Conductors | 49 |
| | 22.1 Direct-connected high-voltage control circuit | 49 |
| | 22.2 Tapped high-voltage control circuits | 49 |

| | | |
|----|--|----|
| 23 | Overcurrent Protection, Transformers | 51 |
| | 23.1 High-voltage transformers | 51 |
| | 23.2 Low-voltage transformers | 52 |
| 24 | Temperature Limiting Means | 52 |
| 25 | Alarms | 54 |
| 26 | Receptacles and Transfer Switches | 54 |
| 27 | Lampholders | 55 |
| 28 | Switches | 55 |
| 29 | Automatic Controls and Control Circuits | 57 |
| | 29.1 General | 57 |
| | 29.2 Terminals and actuating members of safety devices | 58 |
| 30 | Spacings | 59 |
| 31 | Grounding | 60 |
| 32 | Guarding of Heating Elements | 62 |
| | 32.1 General | 62 |
| | 32.2 Panel-type heaters | 63 |
| | 32.3 Floor heaters | 63 |

PERFORMANCE

| | | |
|----|--|----|
| 33 | General | 64 |
| 34 | Power Input Test | 64 |
| 35 | Leakage Current Test | 64 |
| 36 | Normal Temperature Tests | 67 |
| 37 | Conditions for Operation Tests | 71 |
| 38 | Continuous Operation Test | 72 |
| 39 | Terry Cloth Test Fabric | 73 |
| 40 | Alarm Device Endurance Test | 74 |
| 41 | Abnormal Operation Test | 74 |
| | 41.1 General | 74 |
| | 41.2 Abnormal motor temperature test | 74 |
| | 41.3 Stalled fan | 75 |
| | 41.4 Overvoltage test | 76 |
| | 41.5 Tip over | 76 |
| | 41.6 Vertical wall | 76 |
| | 41.7 Terry cloth drape | 77 |
| | 41.8 Litter | 78 |
| | 41.9 Motor overload and stalled motor | 78 |
| | 41.10 Wall-mounted heaters | 80 |
| | 41.11 Floor insert heaters | 81 |
| | 41.12 Ceiling-panel heaters | 82 |
| | 41.13 Abnormal ambient test | 82 |
| 42 | Endurance Test | 83 |
| 43 | Short-Circuit Tests | 84 |
| 44 | Overload Test – High-Voltage Transformers | 85 |
| 45 | Burnout Test – High-Voltage Transformers | 86 |
| 46 | Dielectric Voltage-Withstand Test | 86 |
| 47 | Insulation Resistance Test | 86 |
| 48 | Rain Test | 87 |
| 49 | Static Load Test | 90 |
| 50 | Stability of Cord-Connected, Floor-Supported Heaters | 90 |
| 51 | Element Support Impact Tests | 90 |
| 52 | Test for Permanence of Cord Tag | 91 |
| | 52.1 General | 91 |
| | 52.2 Test conditions | 91 |
| | 52.3 Test method | 92 |

53 Protection Against Personal Injury Test 92
 54 Strength of Adjustment Stop Test..... 93

MANUFACTURING AND PRODUCTION TESTS

55 Production-Line Dielectric Voltage-Withstand 94
 56 Production-Line Grounding Continuity..... 95
 57 Production-Line Tip Over 96

RATINGS

58 Details 96

MARKINGS

59 Details 96
 60 Instructions for Use and Care 103
 60.1 General..... 103
 60.2 Installation 104
 60.3 Important instructions..... 104
 60.4 Operation..... 105
 60.5 Maintenance 105
 60.6 Grounding instructions 106
 60.7 Heater carton information 107

SUPPLEMENT SA – FIXED AND LOCATION DEDICATED ELECTRIC ROOM HEATERS FOR USE UNDER USCG ELECTRICAL ENGINEERING REGULATIONS SUBCHAPTER J, (46 CFR, PARTS 110 – 113)

ELECTRIC ROOM HEATERS FOR MARINE USE

SA1 Scope 109
 SA2 Enclosure..... 109
 SA3 Heating Elements 109
 SA4 Automatic Controls 109
 SA5 Mounting Means 109
 SA6 Performance 109

SUPPLEMENT SB – CEILING INSERT AIR HEATERS WITH LAMPS

INTRODUCTION

SB1 Scope 111

CONSTRUCTION

SB2 Temperature Limiting Means..... 111

PERFORMANCE

SB3 Normal Temperature Test 111
 SB3.1 General..... 111
 SB3.2 Test box 112
 SB3.3 Insulation..... 112

This is a preview. Click here to purchase the full publication.

| | | |
|-----|--|-----|
| | SB3.4 Test procedure | 112 |
| SB4 | Abnormal Operation Tests | 113 |
| | SB4.1 Inherently protected – overlamping | 113 |
| | SB4.2 Thermally protected – overlamping | 113 |
| | SB4.3 Thermally protected – defeated fan motor | 114 |
| | SB4.4 Locked rotor | 115 |
| SB5 | Marking..... | 115 |
| SB6 | Operating and Installation Instructions..... | 116 |

INTRODUCTION

1 Scope

1.1 These requirements cover fixed and location-dedicated electric room heating equipment rated 600 volts or less to be employed in ordinary locations in accordance with the National Electrical Code, ANSI/NFPA 70.

1.2 These requirements do not cover movable heaters, wall- or ceiling-hung heaters, baseboard heaters, duct heaters, central-heating furnaces, fan-coil units, panel- or cable-type radiant-heating equipment, electric boilers, or any other electric heating equipment or appliances that are covered in or as a part of separate, individual requirements.

2 Glossary

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

2.2 **APPLIANCE COUPLER** – A single-outlet, female contact device for attachment to a flexible cord as part of a detachable power-supply cord to be connected to an appliance inlet (motor attachment plug).

2.3 **APPLIANCE INLET (Motor Attachment Plug)** – A male contact device mounted on an end product appliance to provide an integral blade configuration for the connection of an appliance coupler or cord connector.

2.4 **APPLIANCE (FLATIRON) PLUG** – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

2.5 **CEILING SURFACE-MOUNTED HEATER** – A heater that is permanently attached and mounted directly to a ceiling surface in such a manner that tools are necessary for its removal.

2.6 **COMMERCIAL/INDUSTRIAL HEATER** – Any heater that is either:

- a) Rated 2 kilowatts or greater and marked as a commercial/industrial heater in accordance with [59.16](#),
- b) Rated greater than 250 volts,
- c) A polyphase heater, or
- d) Rated greater than 6 kilowatts.

2.7 **COMPONENT** – A device or fabricated part of the appliance covered by the scope of a safety standard dedicated to the purpose. When incorporated in an appliance, equipment otherwise typically field installed (e.g. luminaire) is considered to be a component. Unless otherwise specified, materials that compose a device or fabricated part, such as thermoplastic or copper, are not considered components.

2.8 **CORD CONNECTOR** – A female contact device wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

2.9 **CONTROL CIRCUIT** – A circuit that carries the electric signals directing the performance of a controller which, in turn, governs power delivered to a motor or other load. A control circuit does not carry the main power current.