





**Underwriters Laboratories Inc.®**

A not-for-profit organization dedicated to public safety  
and committed to quality service

**January 12, 1996**

**Revision pages for**

**Standard for**

**Draft Equipment**

**UL 378, Third Edition**

Attached to this transmittal notice is a revision of the Third edition of UL 378.

A CHANGE ON A PAGE DATED JANUARY 12, 1996 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THIS REVISION IS CONSIDERED NON-SUBSTANTIVE AND IS BEING ISSUED TO ELIMINATE THE MERCUROUS NITRATE TEST AND REPLACE IT WITH A 10-DAY MOIST AMMONIA AIR STRESS CRACKING TEST. THE MERCUROUS NITRATE TEST IS BEING ELIMINATED DUE TO THE FACT THAT THE DISPOSAL OF MERCUROUS NITRATE COATED MATERIAL IS INCREASINGLY DIFFICULT. THE 10-DAY MOIST AMMONIA AIR STRESS CRACKING TEST IS AN EQUIVALENT TEST. THE REQUIREMENTS ARE NOW IN EFFECT.

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:

| <b>Page</b>   | <b>Date</b>                               |
|---------------|-------------------------------------------|
| 1 .....       | June 4, 1993 (Reprinted January 12, 1996) |
| 2 .....       | —                                         |
| 3 .....       | January 12, 1996                          |
| 4 – 20 .....  | June 4, 1993                              |
| 21 – 23 ..... | January 12, 1996                          |

**JUNE 4, 1993**

(Title Page Reprinted: January 12, 1996)

**1**

**UL 378**

**Standard for**

**Draft Equipment**

First Edition – July, 1957

Second Edition – April, 1973

**Third Edition**

**June 4, 1993**

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

The Department of Defense (DoD) has adopted UL 378 on June 20, 1994. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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.

**ISBN 1-55989-416-4**

**COPYRIGHT © 1957, 1996 UNDERWRITERS LABORATORIES INC.**

**CONTENTS****FOREWORD****INTRODUCTION**

|                    |   |
|--------------------|---|
| 1 Scope .....      | 5 |
| 2 Components ..... | 5 |

**CONSTRUCTION**

|                                |    |
|--------------------------------|----|
| 3 General .....                | 6  |
| 4 Assembly .....               | 6  |
| 5 Materials .....              | 7  |
| 6 Springs .....                | 7  |
| 7 Diaphragms .....             | 7  |
| 8 General .....                | 8  |
| 9 Uninsulated Live Parts ..... | 9  |
| 10 Motors .....                | 9  |
| 11 Wiring Methods .....        | 10 |
| 12 Spacings .....              | 12 |

**PERFORMANCE**

|                                                         |    |
|---------------------------------------------------------|----|
| 13 General .....                                        | 12 |
| 14 Installation for Temperature Tests .....             | 13 |
| 15 Temperature Measurement .....                        | 13 |
| 16 Normal Temperature Test .....                        | 15 |
| 17 Abnormal Temperature Test .....                      | 19 |
| 18 Stalled Motor Test .....                             | 19 |
| 19 Fan Motor Operation Test .....                       | 19 |
| 20 Draft Regulators Operation Test .....                | 20 |
| 21 Automatic Damper Controls Operation Test .....       | 21 |
| 22 Mercurous-Nitrate Immersion Test .....               | 21 |
| 22A 10-Day Moist Ammonia Air Stress Cracking Test ..... | 22 |

**MANUFACTURING AND PRODUCTION TESTS**

|                  |    |
|------------------|----|
| 23 General ..... | 22 |
|------------------|----|

**MARKING**

|                  |    |
|------------------|----|
| 24 General ..... | 23 |
|------------------|----|

## 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.

20.5 The process described in 20.4 is to be repeated until an uncontrolled draft of 0.20 inch of water above the value of the draft initiating regulation, as observed in 20.3 is obtained.

20.6 Determinations of draft initiating regulation and regulated draft throughout the range, as obtained by the test methods described in 20.3 – 20.5, are then to be made for at least one intermediate and the maximum setting of the draft-regulator control adjustment.

20.7 It is desirable to repeat the above described series of tests at least once to assure that consistent results are obtained.

20.8 The recorded draft initiating regulation, as observed following the procedure in 20.3, shall be not less than 0.01 inch of water for sizes intended for 10 inch diameter flue pipes or smaller.

20.9 The difference between the draft initiating regulation and the regulated draft recorded when the uncontrolled draft is 0.20 inch of water higher than the draft initiating regulation shall not exceed 0.03 inch of water at any given setting of the draft-regulator control adjustment for sizes intended for 10 inch diameter flue pipes or smaller.

20.10 Draft regulators intended for controlling drafts in flue pipes or breechings larger than 10 inch diameter likely to have uncontrolled levels of drafts above 0.20 inch of water may be tested between any minimum and maximum levels of uncontrolled draft having a difference of 0.20 inch of water.

20.11 Determinations of draft initiating regulation and regulated draft throughout the range, as obtained by the test methods described in 20.3 – 20.5, are then to be made for at least one intermediate and the maximum setting of the draft-regulator control adjustment.

20.12 The difference between the draft initiating regulation and the regulated draft recorded when the uncontrolled draft is 0.20 inch of water higher than the draft initiating regulation shall not exceed 0.05 inch of water at any given setting of the draft-regulator control adjustment for sizes intended for larger than 10 inch diameter flue pipes.

## 21 Automatic Damper Controls Operation Test

21.1 An automatic damper control shall provide means to operate a flue-pipe damper of the intended size through an arc of 90 degrees following a change in draft of not more than 0.03 inch of water.

21.2 Parts of an automatic damper control are to be operated throughout their range 100,000 times. During such operation, motors, linkage, and parts subject to load or work are to be tested under applied torques consistent with their intended use.

21.3 The requirements of 21.1 are to be applied both before and after the 100,000 cycle endurance test.

## 22 Mercurous-Nitrate Immersion Test

22.1 *\*Deleted January 12, 1996\**

22.2 *\*Deleted January 12, 1996\**

22.3 *\*Deleted January 12, 1996\**

**22.4 \*Deleted January 12, 1996\*****22A 10-Day Moist Ammonia Air Stress Cracking Test**

22A.1 After being subjected to the conditions described in 22A.2 – 22A.4, a brass part containing more than 15 percent zinc shall show no evidence of cracking when examined using 25X magnification.

\*22A.1 added January 12, 1996\*

22A.2 Each test sample is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Such stresses are to be applied to the sample prior to and maintained during the test. Samples with threads, intended to be used for installing the product in the field, are to have the threads engaged and tightened to the torque specified in Table 22A.1. Teflon tape or pipe compound are not to be used on the threads.

\*22A.2 added January 12, 1996\*

**Table 22A.1**  
**Torque requirements for threaded connections**

| Nominal thread size, inches | Torque pound-inches (N · m) |         |
|-----------------------------|-----------------------------|---------|
| 1                           | 1200                        | (135.6) |
| 1-1/4                       | 1450                        | (163.8) |
| 1-1/2                       | 1550                        | (175.1) |
| 2                           | 1650                        | (186.4) |
| 2-1/2                       | 1750                        | (197.7) |
| 3                           | 1800                        | (203.4) |

\*Table 22A.1 added January 12, 1996\*

22A.3 Three samples are to be degreased and then continuously exposed in a set position for ten days to a moist ammonia-air mixture maintained in a glass chamber approximately 12 by 12 by 12 inches (305 by 305 by 305 mm) having a glass cover.

\*22A.3 added January 12, 1996\*

22A.4 Approximately 600 ml of aqueous ammonia having a specific gravity of 0.94 is to be maintained at the bottom of the glass chamber below the samples. The samples are to be positioned 1-1/2 in. (38.1 mm) above the aqueous ammonia solution and supported by an inert tray. The moist ammonia-air mixture in the chamber is to be maintained at atmospheric pressure and at a temperature of 93°F (34°C).

\*22A.4 added January 12, 1996\*

**MANUFACTURING AND PRODUCTION TESTS****23 General**

23.1 In order to assure compliance with these requirements in production, the manufacturer shall provide regular production-control inspection and tests. The program shall include at least the following tests:

- a) Test on moving parts to determine freedom of movement and correctness of assembly.
- b) Dielectric Withstand Tests for electrical components.

## MARKING

### 24 General

24.1 A device and each essential individual assembly shall be marked with the following information:

- a) The manufacturer's or vendor's name or identifying symbol;
- b) A distinctive catalog designation to specifically identify the product; and
- c) The electrical rating, if any.

24.2 The marking shall be legible and reasonably permanent, as afforded by a metal plate, decalcomania transfer, or waterproof marking ink.

24.3 If a manufacturer produces draft equipment at more than one factory, each assembly shall have a distinctive marking, to identify it as the product of a particular factory.



Subject 378

12 Laboratory Drive  
 Research Triangle Park, NC 27709  
 February 2, 1994

**TO:** Electrical Council of Underwriters Laboratories Inc.,  
 Subscribers to UL's Standards Service for Draft  
 Equipment,  
 and  
 Others Interested

**SUBJECT:** Request for Comments on Proposed Requirements for the  
 Third Edition of the Standard for Draft Equipment, UL  
 378; Replacement of the Mercurous-Nitrate Immersion  
 Test; PROPOSED EFFECTIVE DATE

#### SUMMARY OF TOPICS

This bulletin proposes the following changes in requirements:

- To replace the Mercurous-Nitrate Immersion Test.

**COMMENTS DUE BY: MARCH 2, 1994**

\* \* \* \* \*

This bulletin proposes requirements for UL 378 for your review and comment.

Please note that proposed requirements are of a tentative and early nature and are for review and comment only. Current requirements are to be used to judge a product until these requirements are published in final form.

#### PROPOSED EFFECTIVE DATE

Since these proposed requirements will not necessitate a review or additional testing of currently Listed products, UL proposes that the new requirements become effective upon publication.

#### RATIONALE

Parts made of brass alloys containing more than 15 percent zinc, are subject to applied and residual stresses during forming that may result in cracking or delamination of the part in end-use applications. This cracking or delamination can occur at room temperature and in other common environments. To determine that such parts can be considered acceptable for end-use applications, they are subjected to a mercurous nitrate immersion test. During this test, parts are immersed in a solution containing mercury, water, and nitric acid for 30 minutes.

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

Subject 378

-2-

February 2, 1994

The disposal of the mercurous nitrate waste material (coated parts and solution) in an environmentally-sound manner has become increasingly difficult. Also, there are potential health risks involved if the test is not conducted according to specific procedures.

After consideration of these difficulties, UL has decided to discontinue use of the mercurous nitrate immersion test. In searching for an acceptable alternate test, UL obtained information from ASTM and conducted evaluation tests to find a test that would provide results comparable to those obtained using the existing mercurous nitrate immersion test. As a result of these efforts, UL has determined that a 10-day moist ammonia air stress cracking test would be a suitable replacement. Accordingly, UL proposes to eliminate the Mercurous Nitrate Immersion Test and replace it with a 10-Day Moist Ammonia Air Stress Cracking Test.

### IMPACT

Since the 10-Day Moist Ammonia Air Stress Cracking Test is considered equivalent to the Mercurous-Nitrate Immersion Test, currently Listed draft equipment will not require a review, retest, or modification. All new submittals will be tested in accordance with the new test.

### PROPOSALS

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~. Proposed new requirements are identified by (NEW). In the case of extensively revised paragraphs, the original text is identified by (CURRENT) and is followed by the proposed text identified by (PROPOSED). A paragraph that is proposed to be deleted is identified by (DELETED) and is shown ~~lined-out~~.

5.3 A part made of drawn brass or machined from brass rod shall be capable of withstanding, without cracking, ~~a mercurous-nitrate test for copper and copper alloys.~~ a 10-day moist ammonia air stress cracking test. ~~See 22.1—22.4. See Section 22A.~~

5.3 revised (date of publication)

(DELETED)

### ~~22—Mercurous-Nitrate Immersion Test~~

~~22.1 Brass parts, as described in 5.3, made of copper alloy containing more than 15 percent zinc, shall withstand total immersion for 30 minutes without cracking, in an aqueous mercurous nitrate solution containing 10 grams of mercurous nitrate and 10 milliliters of nitric acid (specific gravity 1.42) per liter of solution.~~

22.1 deleted (date of publication)

~~22.2 Instructions for the preparation of solutions and procedures for replenishment, together with descriptions for cleaning and degreasing of samples, are covered in the method for Mercurous Nitrate Test for Copper and Copper Alloys, ASTM B154-89.~~

22.2 deleted (date of publication)

~~22.3 A test sample shall be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components of the strainer, or with tubing or piping. Such stresses shall be applied to the sample prior to and be effective during the test.~~

22.3 deleted (date of publication)

~~22.4 Testing with mercury is a definite health hazard and it is recommended that equipment for the removal of mercury vapor produced in volatilization be provided. Rubber gloves should be used during testing.~~

22.4 deleted (date of publication)

(NEW SECTION)

## **22A. 10-Day Moist Ammonia Air Stress Cracking Test**

22A.1 After being tested as described in 22A.2 – 22A.4, a brass part containing more than 15 percent zinc shall show no evidence of cracking or delamination when examined using 25x magnification.

22A.1 added (date of publication)

22A.2 Each test sample is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Such stresses are to be applied to the sample prior to and be effective during the test.

22A.2 added (date of publication)

22A.3 Three samples are to be degreased and then continuously exposed in a set position for ten days to a moist ammonia-air mixture maintained in a glass chamber approximately 12 by 12 by 12 inches (305 by 305 by 305 mm) having a glass cover.

22A.3 added (date of publication)

22A.4 Approximately 60 ml of aqueous ammonia having a specific gravity of 0.90 is to be maintained at the bottom of the glass chamber below the samples. The samples are to be positioned 1-1/2 inches (38.1 mm) above the aqueous ammonia solution and supported by an inert tray. The moist ammonia air mixture in the chamber is to be maintained at atmospheric pressure with the temperature constant at approximately 93°F (34°C).

22A.4 added (date of publication)

Subject 378

-4-

February 2, 1994

**Request for Comments on Proposals**

Please provide the following:

1. Your comments concerning the proposed requirements; and
2. Your comments concerning the proposed effective date, should the proposals be adopted.

Written comments should be sent to the attention of Keri Olson at UL's RTP office, 12 Laboratory Drive, Research Triangle Park, NC 27709.

All comments should be sent by March 2, 1994.

*Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix A to this Bulletin regarding designated responsibility for the subject product category.*

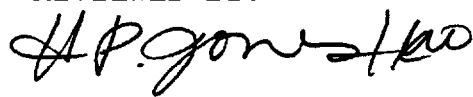
Unless specifically requested to do otherwise, UL will not acknowledge comments indicating concurrence with these proposals.

UNDERWRITERS LABORATORIES INC.

REVIEWED BY:



KERI OLSON (Ext. 1460)  
Associate Project Engineer  
Standards Department  
Research Triangle Park Office



H. P. JONES (Ext. 42948)  
Associate Managing Engineer  
Engineering Services  
Northbrook Office

SR:SAB

378BUL.001