

UL1010

ADOPTION NOTICE

UL1010, "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations," was adopted on October 3, 1994, for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Defense Electronic Supply Center, 1507 Wilmington Pike, Dayton, OH 45444. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. The private sector and other Government agencies may purchase copies from the Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

Custodians:
Army - CR
Navy - YD1
Air Force - 85

Adopting Activity
DLA - ES

FSC 5935

DISTRIBUTION STATEMENT A. Approved for public release;
distribution is unlimited.

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety
for
Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations, UL 1010

Sixth Edition, Dated June 30, 1995

Revisions: This Standard contains revisions through and including December 23, 1996.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The new and/or revised requirements are substantially in accordance with UL's Bulletin on this subject dated August 2, 1996. The bulletin is now obsolete and may be discarded.

The revisions dated December 23, 1996 include a reprinted title page (page 1) for this Standard.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

The master for this Standard at UL's Northbrook Office is the official document insofar as it relates to a UL service and the compliance of a product with respect to the requirements for that product and service, or if there are questions regarding the accuracy of this Standard.

UL's Standards for Safety are copyrighted by UL. Neither a printed copy of a Standard, nor the distribution diskette for a Standard-on-Diskette and the file for the Standard on the distribution diskette 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.

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.

Revisions of UL Standards for Safety are issued from time to time. A UL Standard for Safety is current only if it incorporates the most recently adopted revisions.

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.

UL will attempt to answer support requests concerning WordPerfect, Envoy, and Standards-on-Diskette. However, this support service is offered on a reasonable efforts basis only, and UL may not be able to resolve every support request. UL supports a Standards-on-Diskette only if it is used under the conditions and operating systems for which it is intended. UL's support policies may change from time-to-time without notification.

UL reserves the right to change the format, presentation, file types and formats, delivery methods and formats, and the like of both its printed and electronic Standards without prior notice.

Standards-on-Diskette purchasers agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgement (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing a Standard-on-Diskette on the purchaser's computer system.

If a single-user version Standards-on-Diskette was purchased, one copy of this Standard may be stored on the hard disk of a single personal computer, or on a single LAN file-server or the permanent storage device of a multiple-user computer in such a manner that this Standard may only be accessed by one user at a time and for which there is no possibility of multiple concurrent access. The original distribution diskette should be stored in a safe place.

If a multiple-user version Standards-on-Diskette was purchased, one copy of the Standard may be stored on a single LAN file-server, or on the permanent storage device of a multiple-user computer. The number of concurrent users shall not exceed the number of users authorized for the Standards-on-Diskette version. The original distribution diskette should be stored in a safe place.

Standards-on-Diskette are intended for on-line use, such as for viewing the requirements of a Standard, conducting a word search, and the like. Only one copy of the Standard may be printed from each single-user version of a Standards-on-Diskette. Only one copy of the Standard may be printed for each authorized user of a multiple-user version of a Standards-on-Diskette. An employee of an organization purchasing a Standard-on-Diskette can make a copy of the page or pages being viewed for their own fair and/or practical internal use. Because of differences in the computer/software/printer setup used by UL and those of Standards-on-Diskette purchasers, the printed copy obtained by a purchaser may not look exactly like the on-line screen view or the printed Standard.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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, Classification, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

Copyright 1996 Underwriters Laboratories Inc.

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

Page	Date
tr1 – tr4	December 23, 1996
1	June 30, 1995 (Reprinted: December 23, 1996)
2	July 19, 1996
3	March 26, 1996
4	June 30, 1995
5, 6, 6A, 6B	July 19, 1996
7 – 17	June 30, 1995
18, 18A, 18B, 19, 20, 20A, 20B	March 26, 1996
21 – 25	June 30, 1995
26	July 19, 1996
27	March 26, 1996
28 – 30	June 30, 1995
31, 32	March 26, 1996
33 – 39	June 30, 1995
40 – 42	March 26, 1996
43	June 30, 1995
44, 44A, 44B, 45	March 26, 1996
46	June 30, 1995
47, 48, 48A, 48B	March 26, 1996
49	June 30, 1995
50	December 23, 1996
51, 52, 52A, 52B	July 19, 1996
53, 54	June 30, 1995
SA1 – SA8	March 26, 1996
sr1, sr2	June 30, 1995

No Text on This Page

JUNE 30, 1995

(Title Page Reprinted: December 23, 1996)

**1****UL 1010****Standard for**

**Receptacle-Plug Combinations For Use In
Hazardous (Classified) Locations**

The First through Third editions were titled Receptacle-Plug Combinations for Use in Hazardous Locations.

First Edition – February, 1972
 Second Edition – March, 1973
 Third Edition – December, 1977
 Fourth Edition – February, 1986
 Fifth Edition – February, 1991

Sixth Edition**June 30, 1995**

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated June 30, 1995. 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 1010-1977, June 9, 1977
 Approved as ANSI/UL 1010-1985, August 7, 1995
 Approved as ANSI/UL 1010-1990, June 29, 1990
 Approved as ANSI/UL 1010-1996, June 19, 1996

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.

ISBN 1-55989-879-8

COPYRIGHT © 1972, 1996 UNDERWRITERS LABORATORIES INC.

CONTENTS**FOREWORD****INTRODUCTION**

1 Scope	5
2 General	5
2A Class I, Zone, and Group Equivalency	6

CONSTRUCTION**PLUG AND RECEPTACLE**

3 General	6A
4 Materials	6A
5 Live Parts	7
6 Grounding	7
7 Supply Connections	8
8 Receptacle Employing Interlocking Switch or Circuit Breaker	11
9 Contact and Blade Exposure	11
10 Spacings	13
11 Assembly	15
12 Materials Applied to Joint Surfaces	15
13 Protection Against Corrosion	16
14 Raintight Enclosure	17

PLUG

15 General	17
16 Enclosure	17
17 Strain Relief	18
18 Bushings	18

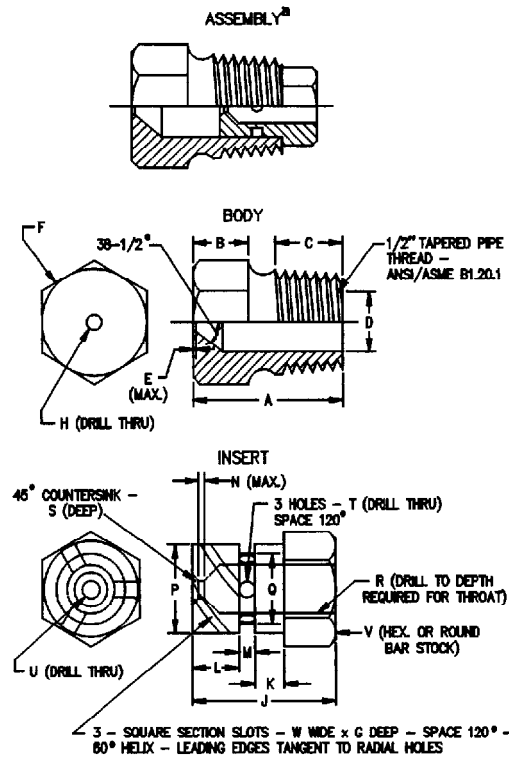
RECEPTACLE

19 General	18
20 Enclosure	18
21 Seal Between Electrical Enclosure and Receptacle Contacts	19
22 Joints in Enclosure	20
23 Shaft Openings	26
24 Supply Connections	27
24A Bonding	31
25 Drain and Breather Plugs in Enclosure	31
26 Holes in Enclosure	32

PLUG AND RECEPTACLE FOR FLAMMABLE ANESTHETIZING LOCATIONS

27 General	33
------------------	----

Figure 42.2
Rain-test spray head



Item	inch	mm	Item	inch	mm
A	1-7/32	31.0	N	1/32	0.80
B	7/16	11.0	P	.575	14.61
C	9/16	14.0	Q	.453	11.51
D	.578	14.68	R	.454	11.53
E	.580	14.73	S	1/4	6.35
F	1/64	0.40	T	1/32	0.80
G	c	c	U	(No. 35) ^b	2.80
H	.06	1.52	V	(No. 40) ^b	2.50
J	(No.9) ^b	5.0	W	5/8	16.0
K	23/32	18.3		0.06	1.52
L	5/32	3.97			
M	1/4	6.35			
	3/32	2.38			

^a Nylon Rain-Test Spray Heads are available from Underwriters Laboratories

^b ANSI B94.11M Drill Size

^c Optional - To serve as a wrench grip.

RT100E

43 Accelerated Aging of Gaskets Test

43.1 A gasket of an elastomeric or thermoplastic material or a composition gasket utilizing an elastomeric material employed in a device to exclude water shall be resistant to aging as determined by the accelerated-aging tests described either in 43.2 or 43.3.

43.2 A gasket of rubber or neoprene, or a composition thereof, is to be exposed in an air oven for 70 hours at $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($212^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$). See UL 157, Table 4.3, for oven aging conditions for service temperatures exceeding 60°C (140°F). The gasket is adequately resistant to aging if there is no visible evidence of deterioration such as softening, hardening, or cracking after flexing.

43.2 revised December 23, 1996

43.3 A gasket of thermoplastic material, or a composition thereof, may be accepted after consideration of the effects of heat, aging, distortion under conditions of use, and the means of securing the gasket to the cover or the enclosure.

44 Watertightness Test

44.1 To determine if a plug for use in flammable anesthetizing locations is watertight, the plug shall be subjected to the test described in 44.2 and 44.3.

44.2 Two sample plugs, one wired with smallest and one with the largest size Type S, SO, ST, or STO cord for which the plug is designed, are to be sealed in accordance with the manufacturer's instructions. The sealed plugs are to be immersed to a depth of 6 inches (152 mm) in ordinary tap water at a nominal temperature of 25°C (77°F) for 20 hours. The plugs are then to be removed from the water, wiped dry, and subjected to the dielectric voltage-withstand test described in 44.3.

44.3 The plugs shall withstand for 1 minute, without breakdown, the application of a 60-hertz essentially sinusoidal potential of 1000 volts plus twice maximum rated voltage. The potential is to be applied between current-carrying parts and the metal plug shell.

RATING

45 General

45.1 A plug and a receptacle shall be rated as follows:

- a) In amperes or volt-amperes, volts, and frequency. It may also be rated in horsepower in addition to an ampere rating.
- b) The number of phases shall be included, if for use on a polyphase circuit.
- c) The voltage rating shall be in accordance with the appropriate single voltage or voltage ranges, such as: 110 – 125, 208, 220 – 250, 254 – 277, 440 – 480, or 550 – 600.

45.2 If a device includes a snap switch or a circuit breaker that controls an outlet, the rating of the device shall be no higher than the rating of the switch or the circuit-breaker mechanism.

July 19, 1996 – UL 1010

tr1

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety
for
Receptacle–Plug Combinations for Use in Hazardous (Classified) Locations, UL 1010

Sixth Edition, Dated June 30, 1995

Revisions: This Standard contains revisions through and including July 19, 1996.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The new and/or revised requirements are substantially in accordance with UL's Bulletins on this subject dated March 26, 1996. The bulletin is now obsolete and may be discarded.

The master for this Standard at UL's Northbrook Office is the official document insofar as it relates to a UL service and the compliance of a product with respect to the requirements for that product and service, or if there are questions regarding the accuracy of this Standard.

UL's Standards for Safety are copyrighted by UL. Neither a printed copy of a Standard, nor the distribution diskette for a Standard-on-Diskette and the file for the Standard on the distribution diskette 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.

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.

Revisions of UL Standards for Safety are issued from time to time. A UL Standard for Safety is current only if it incorporates the most recently adopted revisions.

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.

UL will attempt to answer support requests concerning WordPerfect, Envoy, and Standards-on-Diskette. However, this support service is offered on a reasonable efforts basis only, and UL may not be able to resolve every support request. UL supports a Standards-on-Diskette only if it is used under the conditions and operating systems for which it is intended. UL's support policies may change from time-to-time without notification.

UL reserves the right to change the format, presentation, file types and formats, delivery methods and formats, and the like of both its printed and electronic Standards without prior notice.

Standards-on-Diskette purchasers agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgement (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing a Standard-on-Diskette on the purchaser's computer system.

If a single-user version Standards-on-Diskette was purchased, one copy of this Standard may be stored on the hard disk of a single personal computer, or on a single LAN file-server or the permanent storage device of a multiple-user computer in such a manner that this Standard may only be accessed by one user at a time and for which there is no possibility of multiple concurrent access. The original distribution diskette should be stored in a safe place.

If a multiple-user version Standards-on-Diskette was purchased, one copy of the Standard may be stored on a single LAN file-server, or on the permanent storage device of a multiple-user computer. The number of concurrent users shall not exceed the number of users authorized for the Standards-on-Diskette version. The original distribution diskette should be stored in a safe place.

Standards-on-Diskette are intended for on-line use, such as for viewing the requirements of a Standard, conducting a word search, and the like. Only one copy of the Standard may be printed from each single-user version of a Standards-on-Diskette. Only one copy of the Standard may be printed for each authorized user of a multiple-user version of a Standards-on-Diskette. An employee of an organization purchasing a Standard-on-Diskette can make a copy of the page or pages being viewed for their own fair and/or practical internal use. Because of differences in the computer/software/printer setup used by UL and those of Standards-on-Diskette purchasers, the printed copy obtained by a purchaser may not look exactly like the on-line screen view or the printed Standard.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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, Classification, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

Copyright 1996 Underwriters Laboratories Inc.

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

Page	Date
tr1 – tr4	July 19, 1996
1	June 30, 1995 (Reprinted: March 26, 1996)
2	July 19, 1996
3	March 26, 1996
4	June 30, 1995
5, 6, 6A, 6B	July 19, 1996
7 – 17	June 30, 1995
18, 18A, 18B, 19, 20, 20A, 20B	March 26, 1996
21 – 25	June 30, 1995
26	July 19, 1996
27	March 26, 1996
28 – 30	June 30, 1995
31, 32	March 26, 1996
33 – 39	June 30, 1995
40 – 42	March 26, 1996
43	June 30, 1995
44, 44A, 44B, 45	March 26, 1996
46	June 30, 1995
47, 48, 48A, 48B	March 26, 1996
49 – 50	June 30, 1995
51, 52, 52A, 52B	July 19, 1996
53	June 30, 1995
sa1 – sa8	March 26, 1996
sr-1, sr-2	June 30, 1995

No Text on This Page

June 30, 1995

(Title Page Reprinted: March 26, 1996)

1

UL 1010

Standard for

**Receptacle–Plug Combinations For Use In
Hazardous (Classified) Locations**

The first through third editions were titled Receptacle–Plug Combinations for Use in Hazardous Locations.

First Edition – February, 1972
Second Edition – March, 1973
Third Edition – December, 1977
Fourth Edition – February, 1986
Fifth Edition – February, 1991

Sixth Edition

June 30, 1995

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.

ISBN 1-55989-879-8

COPYRIGHT © 1972, 1996 UNDERWRITERS LABORATORIES INC.

CONTENTS**FOREWORD****INTRODUCTION**

1 Scope	5
2 General	5
2A Class I, Zone, and Group Equivalency	6

CONSTRUCTION**PLUG AND RECEPTACLE**

3 General	6A
4 Materials	6A
5 Live Parts	7
6 Grounding	7
7 Supply Connections	8
8 Receptacle Employing Interlocking Switch or Circuit Breaker	11
9 Contact and Blade Exposure	11
10 Spacings	13
11 Assembly	15
12 Materials Applied to Joint Surfaces	15
13 Protection Against Corrosion	16
14 Raintight Enclosure	17

PLUG

15 General	17
16 Enclosure	17
17 Strain Relief	18
18 Bushings	18

RECEPTACLE

19 General	18
20 Enclosure	18
21 Seal Between Electrical Enclosure and Receptacle Contacts	19
22 Joints in Enclosure	20
23 Shaft Openings	26
24 Supply Connections	27
24A Bonding	31
25 Drain and Breather Plugs in Enclosure	31
26 Holes in Enclosure	32

PLUG AND RECEPTACLE FOR FLAMMABLE ANESTHETIZING LOCATIONS

27 General	33
------------------	----

INTRODUCTION

1 Scope

1.1 These requirements cover receptacles with plugs, receptacles with plugs interlocked with circuit breakers, and receptacles with plugs interlocked with switches, for installation and use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C, and D, and Class II, Division 1, Groups F and G in accordance with the National Electrical Code NFPA 70.

1.1.1 These requirements also cover explosion-proof electrical equipment for installation and use in Class I, Zone 1, Groups IIA, IIB, IIB plus Hydrogen, and IIC hazardous (classified) locations.

1.1.1 added July 19, 1996

1.2 These requirements cover devices rated not more than 200 amperes, not more than 600 volts, alternating-current (ac), and not more than 250 volts, direct-current (dc).

1.3 These requirements cover receptacle-plug combinations for use only under the following atmospheric conditions:

- a) A minimum ambient temperature of minus 25°C (minus 13°F),
- b) An oxygen concentration not greater than 21 percent by volume, and
- c) A nominal barometric pressure of one atmosphere.

1.4 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 as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard cannot be judged to comply with this standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Units of measurement

2.1.1 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.

2.2 Undated references

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

2.3 Components

2.3.1 Except as indicated in 2.3.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.3.2 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.

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

2.3.4 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.

2A Class I, Zone, and Group Equivalency

2A.1 Class I, Zone 1, Group IIA

2A.1.1 Explosion-proof electrical equipment intended to be marked in accordance with 46.1.1 shall comply with all the requirements for explosion-proof electrical equipment for use in Class I, Group D hazardous (classified) locations.

2A.1.1 added July 19, 1996

2A.2 Class I, Zone 1, Group IIB

2A.2.1 Explosion-proof electrical equipment intended to be marked in accordance with 46.1.2 shall comply with all the requirements for explosion-proof electrical equipment for use in Class I, Group C hazardous (classified) locations.

2A.2.1 added July 19, 1996

2A.3 Class I, Zone 1, Group IIB plus Hydrogen

2A.3.1 Explosion-proof electrical equipment intended to be marked in accordance with 46.1.3 shall comply with all the requirements for explosion-proof electrical equipment for use in Class I, Group B hazardous (classified) locations.

2A.3.1 added July 19, 1996

2A.4 Class I, Zone 1, Group IIC

2A.4.1 Explosion-proof electrical equipment intended to be marked in accordance with 46.1.4 shall comply with all the requirements for explosion-proof electrical equipment for use in both Class I, Group A and Class I, Group B hazardous (classified) locations.

2A.4.1 added July 19, 1996

CONSTRUCTION

PLUG AND RECEPTACLE

3 General

3.1 Where reference is made to contact blades, the requirements also apply to flat, round, butt type, and similar contacts.

4 Materials

4.1 A base or body in or on which live parts are mounted shall be of porcelain, phenolic, urea, or cold-molded composition or of equivalent insulating material.

4.2 Among the factors that are to be taken into consideration when determining the acceptability of a nonmetallic material are resistance to:

- a) Mechanical damage,
- b) Impact,
- c) Moisture-absorption,
- d) Combustibility,
- e) Solvents as covered by the hazardous location group or groups under consideration,
- f) Accumulations of electrostatic charges,
- g) Distortion and creep at temperatures to which the material may be subjected under all conditions of use,
- h) Fungus, and
- i) Repeated explosions.

All of these factors are to be considered with respect to thermal aging.

No Text on This Page

22.3 Class I, Group B Locations

22.3.1 The width of a joint in an enclosure having a free internal volume (air volume) of 30 cubic inches (0.5 dm^3), or less, shall not be less than $3/8$ inch (9.53 mm). At a bolt hole the width is to be measured from the inside edge to the nearest edge of the bolt clearance holes. The thickness at the joint flange shall not be less than $3/8$ inch. The clearance between the joint surfaces shall be less than 0.0015 inch (0.038 mm) or such that a 0.0015-inch feeler gauge will not enter the joint more than $1/8$ inch (3.2 mm) at any point. See Figure 22.3.

22.3.2 The width of a joint in an enclosure having a free internal volume (air volume) of more than 30 cubic inches (0.5 dm^3) but not more than 100 cubic inches (1.64 dm^3) shall not be less than $5/8$ inch (15.9 mm). At a bolt hole the width shall be measured from the inside edge to the nearest edge of the bolt clearance holes. The clearance between the joint surfaces shall be less than 0.0015 inch (0.038 mm) or such that a 0.0015-inch feeler gauge will not enter the joint more than $1/8$ inch (3.2 mm) at any point. A rabbet joint in an enclosure shall have a total width of not less than $3/8$ inch (22.2 mm), with neither section of the joint being less than $3/8$ inch (9.5 mm) wide. The diametrical clearance at the axial section of the joint shall not be more than 0.0025 inch (0.064 mm), and the clearance at the radial or clamped section of the joint shall be not more than 0.0015 inch. See Figure 22.2.

22.3.3 The width of a joint in an enclosure having a free internal volume (air volume) of more than 100 cubic inches (1.64 dm^3) but not more than 350 cubic inches (5.7 dm^3) shall not be less than 1 inch (25.4 mm). At a bolt hole, the width is to be measured from the inside edge to the nearest edge of the bolt clearance holes. The clearance between the joint surfaces shall not be more than 0.0015 inch (0.038 mm).

22.3.4 Other than for a conduit connection and a joint having tapered threads, a threaded joint in an electrical enclosure shall have:

- a) At least eight fully-engaged threads with a Class 1 fit,
- b) At least seven with a Class 2 fit, or
- c) At least six with a Class 3 fit.

See the Standard for Unified inch Screw Threads (UN and UNR Thread Form), ANSI/ASME B1.1-1989. A threaded joint in an enclosure having tapered threads shall fully engage at least five threads. Threads shall not be finer than 20 threads per inch (25.4 mm).

22.3.5 A joint of the serrated type with a thread contour shall not have more than 20 serrations per inch (25.4 mm) and shall have at least five fully engaged and tightly clamped serrations.

22.4 Class I, Group A locations

22.4.1 Other than for a conduit connection and a joint having tapered threads, a threaded joint in an enclosure shall have:

- a) At least eight fully engaged threads with a Class 1 fit,
- b) At least seven with a Class 2 fit, or

- c) At least six with a Class 3 fit.

See the Standard for Unified inch Screw Threads (UN and UNR Thread Form), ANSI/ASME B1.1-1989. A threaded joint in an enclosure having tapered threads shall fully engage at least five threads. Threads shall not be finer than 20 threads per inch (25.4 mm).

22.4.2 A joint of the serrated type with a thread contour shall not have more than 20 serrations per inch (25.4 mm) and shall have at least five fully engaged and tightly clamped serrations.

22.5 Class II, Group F and G locations

22.5.1 The width of a straight joint shall not be less than 3/16 inch (4.8 mm). The clearance between the joint surfaces shall not be more than 0.002 inch (0.051 mm) for a 3/16-inch wide joint and not more than 0.003 inch (0.076 mm) for a 1/4-inch (6.4-mm) wide joint. The joint width shall be provided between the inside of the enclosure and the nearest edge of each bolt hole and elsewhere. The width of joint is to be measured with the cover in the most unfavorable position. See 22.1.1 for roughness requirements for a metal-to-metal joint surface.

22.5.1 revised March 26, 1996

22.5.2 If a gasket is used in a joint, it shall be formed of polytetrafluoroethylene, plant-fiber sheet-packing material, or a material having similar characteristics. The gasket material shall be mechanically attached and protected from abuse. The width of gasket contact shall not be less than 3/16 inch (4.8 mm) at all points around the joint.

22.5.2 revised July 19, 1996

22.5.3 If a gasket of polytetrafluoroethylene is used, it shall be installed to reduce the likelihood of cold flow of the gasket material.

22.5.4 A material that upon aging hardens or adheres to metal surfaces, or both, is not considered an acceptable gasket material.

22.5.4 revised July 19, 1996

22.5.5 A threaded joint shall consist of at least three threads fully engaged. A screw shall have not more than 32 threads per inch (25.4 mm).

23 Shaft Openings

23.1 General

23.1.1 A shaft opening in an enclosure shall be of the metal-to-metal, metal-to-polymeric or polymeric-to-ceramic type. See 22.1.1 for roughness of the metal surfaces forming the opening.

23.1.1 revised March 26, 1996

23.2 Receptacle enclosure for Class I locations

23.2.1 Except as noted in 23.2.2 and 23.2.3, a shaft opening in an enclosure shall have a length of path of not less than 1 inch (25.4 mm). The diametrical clearance between the shaft and its opening in the enclosure shall be as specified in Figure 22.1. The diametrical clearance for a path longer than 1-1/4 inches (31.8 mm) shall not be more than 0.0045 inch (0.114 mm).

23.2.1 revised March 26, 1996

23.2.2 An enclosure having a free internal volume of 1.0 cubic inch (0.016 dm³) or less may have a length of path of not less than 9/32 inch (7.1 mm) with a diametrical clearance of not more than 0.005 inch (0.127 mm).

23.2.2 added March 26, 1996

MARKING**46 General**

46.1 Each plug and receptacle shall be marked with the following:

- a) The manufacturer's or private labeler's name, trademark, or other identification symbol.
- b) A distinctive catalog number or an equivalent designation.
- c) The electrical rating.
- d) Ambient temperature rating, if over 40°C (104°F).
- e) Designations of the hazardous location in which the device is intended to be used; for example, "Class _____, Group _____" or for a device intended for simultaneous use in Class I and Class II locations, "Suitable for simultaneous use in Class I, Group _____ and Class II, Group _____ locations" or the equivalent.
- f) The receptacle enclosure shall be marked with the word "CAUTION" and with the following or equivalent statement: "To reduce the risk of ignition of hazardous atmospheres, disconnect the supply circuit before opening. Keep tightly closed when in operation."
- g) Other than for a device intended for use in flammable anesthetizing locations that complies with the requirements in 27.1 — 27.8, designation of the mating part with which the device is intended to be used; for example, "For use with plug," "For use with receptacle." This information shall be marked on the equipment or it shall be included in the instructions provided with each device.
- h) A device that has been found acceptable for outdoor use shall be marked, "Raintight," together with any necessary information on the required conditions of installation to ensure raintightness. The information required for raintightness may be packed with the product if the marking on the device refers to this information.
- i) Maximum operating temperature or operating temperature code as specified in Table 46.1 if the operating temperature exceeds 100°C (212°F). The operating temperature or temperature code shall be located near the marking required by (e).

46.1.1 In addition to, or as an alternative to, the marking requirement in 46.1(e), equipment that has been investigated and found to comply with the requirements for Class I, Group D locations may additionally or alternatively be marked Class I, Zone 1, Group IIA.

46.1.1 added July 19, 1996

46.1.2 In addition to, or as an alternative to, the marking requirement in 46.1(e), equipment that has been investigated and found to comply with the requirements for Class I, Group C locations may additionally or alternatively be marked Class I, Zone 1, Group IIB.

46.1.2 added July 19, 1996

46.1.3 In addition to, or as an alternative to, the marking requirement in 46.1(e), equipment that has been investigated and found to comply with the requirements for Class I, Group B locations may be marked Class I, Zone 1, Group IIB plus Hydrogen.

46.1.3 added July 19, 1996

46.1.4 In addition to, or as an alternative to, the marking requirement in 46.1(e), equipment that has been investigated and found to comply with the requirements for both Class I, Group A, and Class I, Group B locations may additionally or alternatively be marked Class I, Zone 1, Group IIC.

46.1.4 added July 19, 1996

46.1.5 Equipment marked Group IIB may also be marked Group IIA.

46.1.5 added July 19, 1996

46.1.6 Equipment marked Group IIC may also be marked Group IIA, Group IIB, or both Group IIA and Group IIB.

46.1.6 added July 19, 1996

Table 46.1
Temperature marking

Maximum operating temperature ^a		Operating temperature code
°C	°F	
450	842	T1
300	572	T2
280	536	T2A
260	500	T2B
230	446	T2C
215	419	T2D
200	392	T3
180	356	T3A
165	329	T3B
160	320	T3C
135	275	T4
120	248	T4A
100	212	T5
85	185	T6

^a Based on a 40°C (104°F) ambient.

46.2 Other than as noted in 46.1 (g) and (h), the marking specified in 46.1 shall be:

- a) On a permanently attached nameplate, or
- b) Embossed, stamped, or molded in the enclosure.

46.3 The marking shall be legible and prominent and shall be located so that it will be visible after installation of the equipment.

46.4 A receptacle employing a manually removable cover attached to the receptacle by a chain shall be marked with the word "CAUTION" and the following or equivalent statement: "To reduce the risk of electric shock, the receptacle cover must be replaced upon removing the plug from receptacle."

46.5 Unless field-wiring connections are evident, a wiring diagram shall be attached to both the plug and the receptacle.

46.6 With regard to the requirement specified in 46.5, a paper sticker glued or shellacked, or both, to an inside surface of an accessible cover is considered to be adequately attached to the component.

46.7 If the terminals or wires in a terminal box or compartment of a receptacle enclosure intended for power-supply connection attain a temperature of more than 60°C (140°F) during the normal temperature test, the receptacle enclosure shall be marked with the following statement or the equivalent, at or near the point where supply connections are made, and located so that it will be readily visible during installation: "For supply connections, use wires rated for at least ...°C (...°F)." The temperature value to be used shall be in accordance with Table 46.2.

No Text on This Page

Northbrook, Illinois • (847) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400
 Camas, Washington • (360) 817-5500



Subjects 2279 (674, 698, 844,
 886, 913, 1010, 1604)
 (In reply refer to Subject 2279)

333 Pfingsten Road
 Northbrook, IL 60062-2096
 May 17, 1996

TO: See Appendix A for the List of Addressees

SUBJECT: Request for Comments on Proposed Requirements for the Proposed First Edition of the Standard for Electrical Equipment for Use In Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations, UL 2279; PROPOSED EFFECTIVE DATE

SUMMARY OF TOPICS

This bulletin contains the proposed draft of the first edition of the Standard for Electrical Equipment for Use In Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations, UL 2279

COMMENTS ON THIS PROPOSAL DUE: JUNE 17, 1996

Attached as Appendix B is the draft of UL 2279. Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendices C through I of this bulletin regarding designated responsibility for the subject product categories.

PROPOSED EFFECTIVE DATE

This proposed new standard will not necessitate a review or additional testing of currently Listed products. Therefore, UL proposes that the new standard UL 2279 become effective upon publication.

RATIONALE

UL is proposing to adopt the first edition of the Standard for Electrical Equipment for Use In Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations, UL 2279. This standard will contain requirements for all protection methods for use in Class I, Zone 0, 1, and 2 Hazardous (Classified) Locations. This Standard identifies applicable IEC requirements by reference and then details any specific deviations. The IEC requirements referenced are contained in the following IEC Standards:

IEC 79-0, Electrical Apparatus for Explosive Gas Atmospheres, Part 0: General Requirements,
 IEC 79-1, Electrical Apparatus for Explosive Gas Atmospheres, Part 1:
 Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus,

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

IEC 79-2, Electrical Apparatus for Explosive Gas Atmospheres, Part 2: Electrical Apparatus - Type of Protection "p",
 IEC 79-7, Electrical Apparatus for Explosive Gas Atmospheres, Part 7: Increased Safety "e",
 IEC 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i",
 IEC 79-15, Electrical Apparatus for Explosive Gas Atmospheres, Part 15: Electrical Apparatus with Type of Protection "n",
 IEC 79-18, Electrical Apparatus for Explosive Gas Atmospheres, Part 18: Encapsulation "m".

This Standard is a result of the newly adopted Zone classification scheme in Article 505 of the National Electrical Code, NFPA 70-1996, and the subsequent need for documenting these protection method requirements. It also represents existing UL internal practice with regard to Listing equipment for use in Zones. The Standard is a natural culmination of UL's efforts to harmonize North American hazardous location requirements with those of the international community, as detailed in UL's Subject 35 bulletin dated October 31, 1995. Additionally, manufacturers indicated a need for a UL Standard to address Zones during a May 14, 1996 Ad Hoc meeting (detailed Meeting Report to follow).

UL's participation in the international standards writing activities for the IEC Publication 79 Series of Standards, and our Memorandum of Understanding and other test data exchange programs with European test houses, has been in place for years, is ongoing and provides a forum for continued harmonization efforts regarding deviations to the IEC 79 Standards.

The current deviations documented by this Standard are based on superseding requirements set forth by the NEC, and on the need to protect against electrical shock and fire hazards that are normally associated with ordinary location requirements. Additionally, requirements for bi-pin fluorescent fixtures were added to this Standard to address the lack of requirements for this common type of design. These requirements are based on existing practice by the European test houses and upcoming revisions to the CENELEC EN50019 Standard.

IMPACT

If this standard is adopted it will not require a review or retest of presently Listed or Recognized products.

UL is willing to consider agreements with other agencies to facilitate test data exchange whereby UL generated test data may be used in foreign certification submittals.

Request for Comments on Proposals

Please provide the following:

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

Comments should be sent to the attention of Alan McGrath at the Northbrook office of UL, 333 Pfingsten Road, Northbrook, Illinois 60062-2096. Please reference all correspondence to Subject 2279.

All comments should be sent by June 17, 1996.

Subject 2279

-3-

May 17, 1996

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

UNDERWRITERS LABORATORIES INC.

Alan McGrath

ALAN McGRATH (Ext. 43038)
Project Engineer
Standards Department

REVIEWED BY:

Kerry McManama/am

KERRY MCMANAMA (Ext. 42469)
Engineering Group Leader
Hazardous Locations
Engineering Services – 418B

SR:JTM

2279.ULS

Subjects 2279

-A1-

May 1996

A P P E N D I X A

TO: Casualty Council of Underwriters Laboratories Inc.,
 Electrical Council of Underwriters Laboratories Inc.,
 Fire Council of Underwriters Laboratories Inc.,
 Subscribers to UL's Listing, Classification, and Recognition Services for Equipment for
 Use in and Relating to Hazardous (Classified) Locations
 Subscribers to UL's Standards Service for:
 Electric Motors and Generators for Use in Hazardous (Classified) Locations,
 UL 674
 Industrial Control Equipment for Use in Hazardous (Classified) Locations, UL 698
 Electric Lighting Fixtures for Use in Hazardous (Classified) Locations, UL 844
 Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations, UL 886
 Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II,
 and III, Division 1, Hazardous (Classified) Locations, UL 913
 Receptacles Plug Combinations for Use in Hazardous (Classified) Locations,
 UL 1010
 Electrical Equipment for Use in Class I and II, Division 2, and Class III
 Hazardous (Classified) Locations, UL 1604

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.

APPENDIX B

PROPOSED REQUIREMENTS AND PROPOSED EFFECTIVE DATE
FOR THE PROPOSED FIRST EDITION OF THE STANDARD FOR
ELECTRICAL EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1, AND 2 HAZARDOUS (CLASSIFIED)
LOCATIONS, UL 2279

PROPOSED EFFECTIVE DATE: EFFECTIVE UPON PUBLICATION

CONTENTS

1 Scope	3
2 General	3
Part 0 – General Requirements	
3 Preface	5
4 Scope	5
5 Connection Facilities for Earthing or Equipotential Bonding Conductors	5
6 Cable and Conduit Entries	5
7 Marking	5
8 Appendix A	5
9 Appendix B	5
10 Appendix C	5
Part 1 – Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus	
11 Scope	6
12 Connection of Conductors and Cables	6
Part 2 – Electrical Apparatus - Type of Protection "p" (purged/pressurized)	
13 Scope	7
Part 7 – Increased Safety "e"	
14 Scope	8
15 Normative References	8
16 Luminaires Designed for Mains Supply	8
17 Appendix A	11
Part 11 – Intrinsic Safety "i"	
18 Scope	12
Part 15 – Electrical Apparatus with Type of Protection "n" (nonincendive)	
19 Scope	13
Part 18 – Encapsulation "m"	
20 Scope	14

1 Scope

1.1 These requirements cover equipment for use and installation in Class I, Zones 0, 1, and 2, Gas Groups IIA, IIB, and IIC, hazardous (classified) locations, in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements do not cover equipment for use in Gas Group I.

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 as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard cannot be judged to comply with this standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Except as modified by Parts 0 through 18 of this Standard, equipment shall comply with International Electrotechnical Commission (IEC) Publication 79-0, Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements, and one or more of the following specific protection method Standards:

IEC 79-1, Electrical Apparatus for Explosive Gas Atmospheres, Part 1:
Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus

IEC 79-2, Electrical Apparatus for Explosive Gas Atmospheres, Part 2: Electrical Apparatus - Type of Protection "p",

IEC 79-7, Electrical Apparatus for Explosive Gas Atmospheres, Part 7: Increased Safety "e",

IEC 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i",

IEC 79-15, Electrical Apparatus for Explosive Gas Atmospheres, Part 15: Electrical Apparatus with Type of Protection "n",

IEC 79-18, Electrical Apparatus for Explosive Gas Atmospheres, Part 18: Encapsulation "m".

Exception: Equipment for use only in Zone 2, and that complies with the requirements of IEC 79-15 as modified by Part 15 of this Standard, need not comply with IEC 79-0, General Requirements, or Part 0 of this Standard.

2.2 Equipment complying with the requirements of one or more of the protection methods specified in 2.1 is suitable for use and installation in a Zone classified hazardous location as specified in Table 2.1

Table 2.1

Area classification	IEC Standard	Protection method identification
Zone 0	IEC 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i"	Ex ia
Zone 1	IEC 79-1, Electrical Apparatus for Explosive Gas Atmospheres, Part 1: Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus	Ex d
	IEC 79-2, Electrical Apparatus for Explosive Gas Atmospheres, Part 2: Electrical Apparatus - Type of Protection "p"	Ex p
	IEC 79-7, Electrical Apparatus for Explosive Gas Atmospheres, Part 7: Increased Safety "e"	Ex e
	IEC 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i"	Ex ib
	IEC 79-18, Electrical Apparatus for Explosive Gas Atmospheres, Part 18: Encapsulation "m"	Ex m
Zone 2	IEC 79-15, Electrical Apparatus for Explosive Gas Atmospheres, Part 15: Electrical Apparatus with Type of Protection "n"	Ex nA, nC, & nR

2.3 The numbering scheme used to number the various parts of this standard is based on the standard number of the IEC document that the particular part of this standard covers. For example, the modifications to IEC 79-18 are contained in Part 18 of this standard.

2.4 Equipment covered by this Standard shall also comply with the applicable requirements for similar equipment for use in ordinary locations.

Part 0 -- General Requirements

3 Preface

3.1 Except as modified by 4.1 through 10, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in clause 1 through clause 25, Annexes A through E, and Amendments 1 and 2 of the second edition of IEC Publication 79-0, Electrical Apparatus for Explosive Gas Atmospheres, Part 0: General Requirements. The equipment shall also comply with one or more of the protection methods identified in Parts 1 through 18 of this Standard, as applicable.

Exception: Equipment for use only in Zone 2, and that complies with the requirements of IEC 79-15 as modified by Part 15 of this Standard, need not comply with IEC 79-0, General Requirements, or Part 0 of this Standard.

4 Scope

4.1 Clause 1.1 -- Add "Encapsulation (Publication 79-18)" to the specific types of protection that supplement or modify 79-0, and delete "Sand-filled Apparatus(Publication 79-5) and Oil Immersed Apparatus(Publication 79-6)".

5 Connection Facilities for Earthing or Equipotential Bonding Conductors

5.1 Clause 13.1 -- Add the following text, "The requirements of Section 13 shall be superseded by Section 505-25 of the NEC, as applicable."

6 Cable and Conduit Entries

6.1 Clause 15.1 -- Add the following text, "The requirements of Section 15 shall be superseded by Section 505-15 of the NEC, as applicable."

7 Marking

7.1 Clause 25.2.(12) -- Add the sub-clause and text, "Class I, Zone 0, 1, or 2, as applicable."

8 Appendix A -- This is "Informative."

9 Appendix B -- This is "Informative."

10 Appendix C -- Delete.

Part 1 -- Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus

11 Scope

11.1 Except as modified by 12.1, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 15, Annexes A and B, and Amendment 1 of the third edition of IEC Publication 79-1, Electrical Apparatus for Explosive Gas Atmospheres, Part 1: Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus. The equipment shall also comply with Part 0 of this Standard.

12 Connection of Conductors and Cables

12.1 Clause 11.1 -- Add the following text, "The requirements of Section 11 shall be superseded by Section 505-15 of the NEC, for field connections, as applicable."

Subject 2279

-B7-

May 1996

Part 2 – Electrical Apparatus - Type of Protection "p" (purged/pressurized)

13 Scope

13.1 Except as modified by 13.2, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 19, Annexes A , B, and C, of the third edition of IEC Publication 79-2, Electrical Apparatus for Explosive Gas Atmospheres, Part 2: Electrical Apparatus- Type of Protection "p". The equipment shall also comply with Part 0 of this Standard.

13.2 There are presently no modifications to IEC Publication 79-2, Electrical Apparatus for Explosive Gas Atmospheres, Part 2: Electrical Apparatus- Type of Protection "p".

Part 7 – Increased Safety “e”

14 Scope

14.1 Except as modified by 15.1 through 17.1, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 8, Annexes A through E, and Amendment 1 and 2 of the second edition of IEC Publication 79-7, Electrical Apparatus for Explosive Gas Atmospheres, Part 7: Increased Safety “e”. The equipment shall also comply with Part 0 of this Standard.

15 Normative References

15.1 Add the following “Normative references” resulting from the addition of fluorescent bi-pin lamp requirements:

- a) IEC 68-2-42, Basic environmental testing procedures; part 2: Tests Kc: Sulphur dioxide test for contacts and connections
- b) IEC 68-2-6, Basic environmental testing procedures; part 2: Tests Fc and guidance: Vibration (sinusoidal)
- c) IEC 947-1, low voltage switchgear and control gear. Part 1: General requirements
- d) IEC 400, Lampholders for tubular fluorescent lamps and starter holders
- e) IEC 664, Insulation coordination for equipment within low voltage systems. Part 1: Principles, requirements and tests.
- f) IEC 1195, Double-capped fluorescent lamps - Safety specifications

16 Luminaires Designed for Mains Supply

16.1 Insert the following after a) in clause 5.2.1:

- b) Tubular fluorescent bi-pin lamps with G13 or G5 lamp caps according to IEC 1195. Lampholder and lamp socket shall comply with 5.2.7.

16.2 Add the following clauses after clause 5.2.6:

5.2.7 Luminaires for tubular fluorescent bi-pin lamps shall comply with the following requirements (Annex A.1 through A.4 do not apply while Annex A.5 does apply).

5.2.7.1 The mechanical dimensions and the mounting conditions in the luminaire shall take into account the mechanical values and the tolerances specified for the lamp in IEC 400 and IEC 1195.

5.2.7.2 The lampholder shall comply with the requirements for G 13 or G5 in IEC 400.

5.2.7.3 The two poles on each side of the lamp shall be connected in parallel inside each lampholder. Therefor the filament of the lamp is not heated and the lamp is of the cold starting type using an electronic ballast. The current carrying capacity of each pole (one pin) shall be rated for the whole current of the lamp to achieve redundancy.

5.2.7.4 The creepage distances and clearances shall be based upon the maximum igniting (striking) voltage of the lamp/ballast. The metal ring of the lamp tube shall be assumed to be on the electrical potential of the pins.

5.2.7.5 The maximum values for torque and/or force occurring when fitting or removing the lamp in the luminaire shall be not more than 50% of the limit values that may be applied to the pins of the lamp specified in IEC 1195.

5.2.7.6 The electrical contact between each pin of the lamp and the lampholder must be evaluated under corrosion and vibration conditions. The type tests are given in 6.3.3 and 6.3.4.

5.2.7.7 An isolation switch shall be provided. It shall deenergize each lampholder when the protective cover of the luminaire is removed. The switch shall comply with the following:

- The switch must be an isolator (IEC 664, IEC 947-1 Category III) or the contact clearance of each pole shall be at least 1.25 mm for a maximum supply voltage of 300 V (DC or R.M.S.)
- The operation of the contacts shall be compulsory or the switch must fail to the safe condition (open contact)
- The switch and its operation shall not be capable of manual defeating. one solution may be IP 2X protection according to IEC 529 of the operating part of the switch. Another solution may be that the switch can only be closed (after operating) by means of a tool.

5.2.7.8 For the insulating material of the lampholder, IEC 79-0 applies.

16.3 Add clause 6.3.3 and 6.3.4 after clause 6.3.2:

6.3.3 Sulfur dioxide test for bi-pin lamp caps/lampholders

the contacts shall be tested according to IEC 68-2-42, Sulfur dioxide test for contacts and connections, with the following conditions applying:

- State of the contacts during the test: fully assembled
- Duration of the test: 21 days
- After the test the contact resistance shall not have increased by more than 50% of the initial value.

6.3.4 Vibration test for luminaires with bi-pin lamp caps/lampholders.

The luminaires shall be submitted to a vibration endurance test according to IEC 68-2-6.

A complete sample of the luminaire is mounted by its normal fixings to a rigid test fixture, and exposed to frequencies between 1 Hz and 100 Hz.

Between 1 and 9 Hz the amplitude shall be 1.5 mm; between 9 and 100 Hz the test unit shall be subjected to an acceleration of 0.5 g.

The frequency sweep rate shall be 1 octave per minute with an endurance exposure of 20 cycles in each of the orthogonal planes.

After the exposure, there shall be no visible mechanical damage on all parts of the luminaire. Furthermore, during the test the luminaire shall be operated and the current from the lampholder to the lamp shall be monitored. Only one pin shall be connected electrically at each side of the lamp. The test is satisfactory, if during the exposure to vibration no significant change in the current flow occurs. In the case that it is difficult to detect interruptions of the lamp current at the rated frequency, a test with a direct current of similar value than the rated lamp current (r.m.s. value) may be conducted. In this case the test arrangement in Fig. 1 shall be used.

Alternatively, the test may be conducted with hydrogen/air mixture of $(21 \pm 2\%$ hydrogen in air) inside the luminaire. The test is passed if no ignition occurs during the exposure.

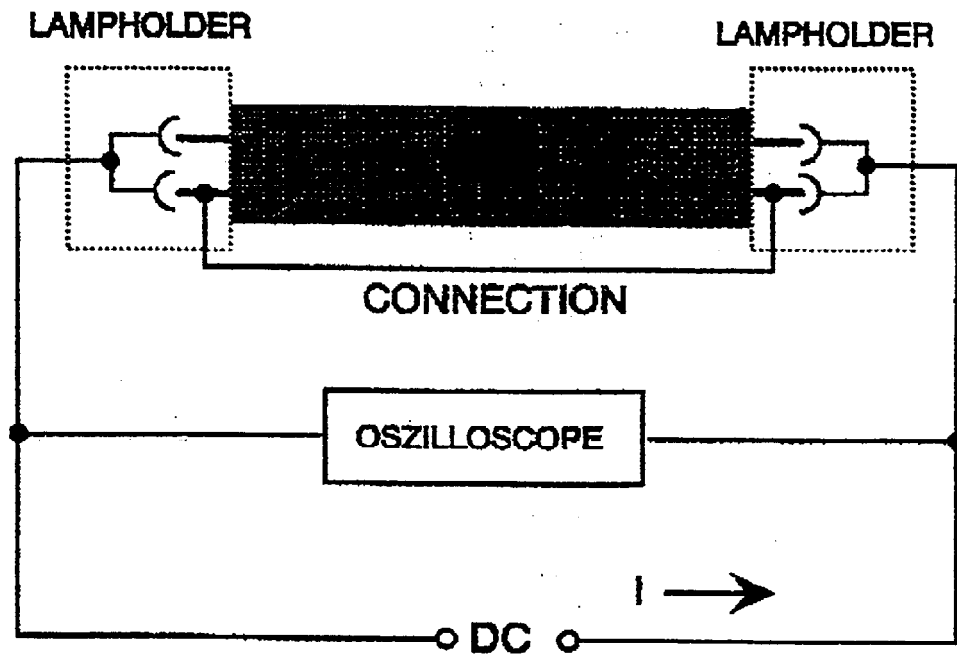


Fig. 1: Test arrangement for vibration test with direct current

17 Appendix A

17.1 Add the following after A.4:

A.5 Requirements for Current Transfer

A.5.1 The current transfer to the lamp cap shall be effected:

a) in the case of screw caps

- to the bottom contact of the caps through resilient or spring contact elements with a force of at least 15N, and

- to the lamp cap through at least two threads or through one or more spring elements with a total contact force of at least 30N;

b) in the case of cylindrical pin caps through spring elements having a contact force of at least 10N;

c) in the case of cylindrical plug-in caps, where the design shall not allow electrical sparking in or external to the joint between the cap and holder, through spring elements having a contact force of at least 10N;

d) in the case of caps where, on removal from the respective lamp holder, the circuit is interrupted in a separate flameproof enclosure (complying with IEC 79-1) in such a way that the contact force exerted by the spring elements on the caps is not less than 7.5N at the moment of circuit interruption.

A.5.2 The above minimum values prescribed for the contact force apply with the lamp fitted to the holder and ready for use. The pressure of the contact elements shall not be affected significantly by heating and other effects to be expected during operation.

Subject 2279

-B12-

May 1996

Part 11 -- Intrinsic Safety "i"

18 Scope

18.1 Except as modified by 18.2, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 10, Annexes A , B, and C, of the third edition of IEC Publication 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i". The equipment shall also comply with Part 0 of this Standard.

18.2 There are presently no modifications to IEC Publication 79-11, Electrical Apparatus for Explosive Gas Atmospheres, Part 11: Intrinsic Safety "i".

Subject 2279

-B13-

May 1996

Part 15 -- Electrical Apparatus with Type of Protection 'n' (nonincendive)

19 Scope

19.1 Except as modified by 19.2, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 23 and Appendix A of the first edition IEC Publication 79-15, Electrical Apparatus for Explosive Gas Atmospheres, Part 15: Electrical Apparatus with Type of Protection "n".

19.2 There are presently no modifications to IEC Publication 79-15, Electrical Apparatus for Explosive Gas Atmospheres, Part 15: Electrical Apparatus with Type of Protection "n".

Part 18 – Encapsulation “m”

20 Scope

20.1 Except as modified by 20.2, equipment for use in Zone classified hazardous locations shall comply with the requirements that appear in Clause 1 through Clause 10, Annexes A, B, and C, of the first edition of IEC Publication 79-18, Electrical Apparatus for Explosive Gas Atmospheres, Part 18: Encapsulation “m”. The equipment shall also comply with Part 0 of this Standard.

20.2 There are presently no modifications to IEC Publication 79-18, Electrical Apparatus for Explosive Gas Atmospheres, Part 18: Encapsulation “m”.

APPENDIX C

Designated Responsibility for UL 674 Product Categories

PSPT, Generators for Use in Hazardous Locations
PTDR and PTDR2, Motors for Use in Hazardous Locations
PTKQ, Motors and Generators, Rebuilt, for Use in Hazardous Locations
PUCJ, Motors, Specialty, for Use in Hazardous Locations

The following individual is involved with the investigation of products covered under the subject categories. As the Primary Designated Engineer, he coordinates the establishment and uniform interpretation of UL requirements applicable to the product categories.

Should you have questions regarding the interpretation of the requirements proposed in this bulletin or any adopted requirements that affect your product, you are encouraged to contact:

CCN	Office/Subsidiary	Responsible Engineer	Extension
PSPT, PTDR, PTKQ, PTDR2, PUCJ	Northbrook	RUSS FILIP	42841

The Industry Advisory Conference (IAC) Chairman for the subject categories is Lee Hewitt at UL's Northbrook Office. The IAC Chairman oversees the significant interpretations made by the Primary Designated Engineer and arbitrates any differences regarding interpretation of UL requirements.