

# UL 248-11

ISBN 0-7629-0561-1

## Low-Voltage Fuses – Part 11: Plug Fuses



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UL Standard for Safety for Low-Voltage Fuses – Part 11: Plug Fuses, UL 248-11

Second Edition, Dated August 1, 2000

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

Page	Date
1-22 .....	August 1, 2000

**National Association of  
Standardization and  
Certification of the Electrical  
Sector**

**NMX-J-009/248/11-2000-ANCE**  
First Edition



**CSA International**  
**CSA C22.2 No. 248.11-00**  
Second Edition



**Underwriters Laboratories  
Inc.**  
**UL 248-11**  
Second Edition



## **Low-Voltage Fuses – Part 11: Plug Fuses**

August 1, 2000

## **Commitment for Amendments**

This Standard is issued jointly by the National Association of Standardization and Certification of the Electrical Sector (ANCE), CSA International, and Underwriters Laboratories Incorporated (UL). Amendments to this Standard will be made only after processing according to the Standards writing procedures by ANCE, CSA, and UL.

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

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**ISBN 1-55324-246-7**

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**ISBN 0-7629-0561-1**

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## Preface

This is the common UL, CSA, and ANCE Standard for *Low-Voltage Fuses – Part 11: Plug Fuses*. This is the second edition of CSA C22.2 No. 248.11-00 (superseding the first edition, published in 1996), the second edition of UL 248-11, and the first edition of NMX-J-009/248/11-2000-ANCE.

This Standard was prepared by a Technical Harmonization Committee comprised of members from Underwriters Laboratories, CSA International, the National Association of Standardization and Certification of the Electrical Sector, the end product manufacturers, and material suppliers. The efforts and support of the members of the Technical Harmonization Committee are gratefully acknowledged.

This Standard was reviewed by the CSA Subcommittee on Fuses and approved by the Technical Committee on Industrial Products under the jurisdiction of the CSA Strategic Resource Group.

This Standard will be submitted to the American National Standards Institute (ANSI) for publication as an American National Standard.

*Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

### Level of Harmonization

This trinational standard is published as an Identical Standard. An identical standard is a standard that is the same in technical content except for conflicts in Codes and Governmental Regulations. Presentation is word for word except for editorial changes.

### Interpretations

The interpretation by the SDO (Standards Development Organization) of an identical standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the SDO. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the SDOs to more accurately reflect the intent.

### UL Effective Date

This edition of the standard is now in effect.

### CSA Effective Date

The effective date for CSA will be announced through *CSA Informs* or *CSA Certification Notice*.

### ANCE Effective Date

The effective date for ANCE will be announced through the *Diario Oficial de la Federation (Official Gazette)* and is indicated on the cover page.



## Foreword (ANCE)

The Present Mexican Standard was developed by the Low Voltage Fuses Subcommittee from the Comité de Normalización de la Asociación Nacional de Normalización y Certificación del Sector Eléctrico, A.C., CONANCE, with the collaboration of the fuse manufacturers and users.

ANCE is a National Organization for Standardization (ONN) registered by the DGN (Dirección General de Normas) in the electrical sector and household appliances which develops Mexican Standards (NMX) and collaborates in the development of the Mexican Official Standards (NOM), voluntary and mandatory standards, respectively.

The conformity assessment in accordance with ANCE Mexican Standards is responsibility of ANCE Certification Products Division.

The ANCE Certification Products Division is accredited by the EMA (Entidad Mexicana de Acreditación) in order to certificate a variety of products. The certification is carry out following the corresponding procedures established and developed by the Technical Committee of Certification in connection with the test reports performed in test labs accredited by the EMA.

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## Foreword (CSA)

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## Foreword (UL)

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

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

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

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

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

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

# Low-Voltage Fuses – Part 11: Plug Fuses

## 1 General

### NOTE –

*This Part is intended to be read together with the Standard for Low-Voltage Fuses – Part 1: General Requirements, hereafter referred to as Part 1. The numbering of the Clauses in this Part correspond to like numbered Clauses in Part 1. The requirements of Part 1 apply unless modified by this Part. For Clauses not shown below, refer to the Standard for Low-Voltage Fuses – Part 1: General Requirements, NMX-J-009/248/11-2000-ANCE ♦ CSA C22.2 No. 248.1 ♦ UL 248-1.*

## 1.1 Scope

This Part applies to plug fuses rated 30 A or less and 125 V ac (127 V ac for Mexico). DC ratings are optional.

## 4 Classification

Plug fuses are non-renewable and not current limiting, with an interrupting rating of 10,000 A. Plug fuses are divided into 3 sub-classifications. Time-delay ratings are optional.

### Edison-base

Plug fuses which are interchangeable for all current ratings. No rejection feature is used. See Figure A.

### Type C

Plug fuses which have a non-interchangeable feature for 3 current ranges (0 – 15, 16 – 20, and 21 – 30 A). See Figure A.

### Type S

Plug fuses which have a non-interchangeable feature for 3 current ranges (0 – 15, 16 – 20, and 21 – 30 A). See Figure B.

In Canada only, Type C and Type S fuses may be used, and for all ratings 15 – 30 A, these fuses shall have low melting point "P" ("D" for time delay) characteristics.

## **5 Characteristics**

### **5.2 Voltage rating**

For AC, the rating shall be 125 V ac or, for fuses intended for installation in Mexico, the rating shall be 127 V ac.

The DC voltage rating may be different from the AC rating.

### **5.3 Current rating**

30 A and less.

### **5.5 Interrupting rating**

For AC – 10,000 A

For DC – 10,000 A

## **6 Marking**

### **6.1 Marking of fuses**

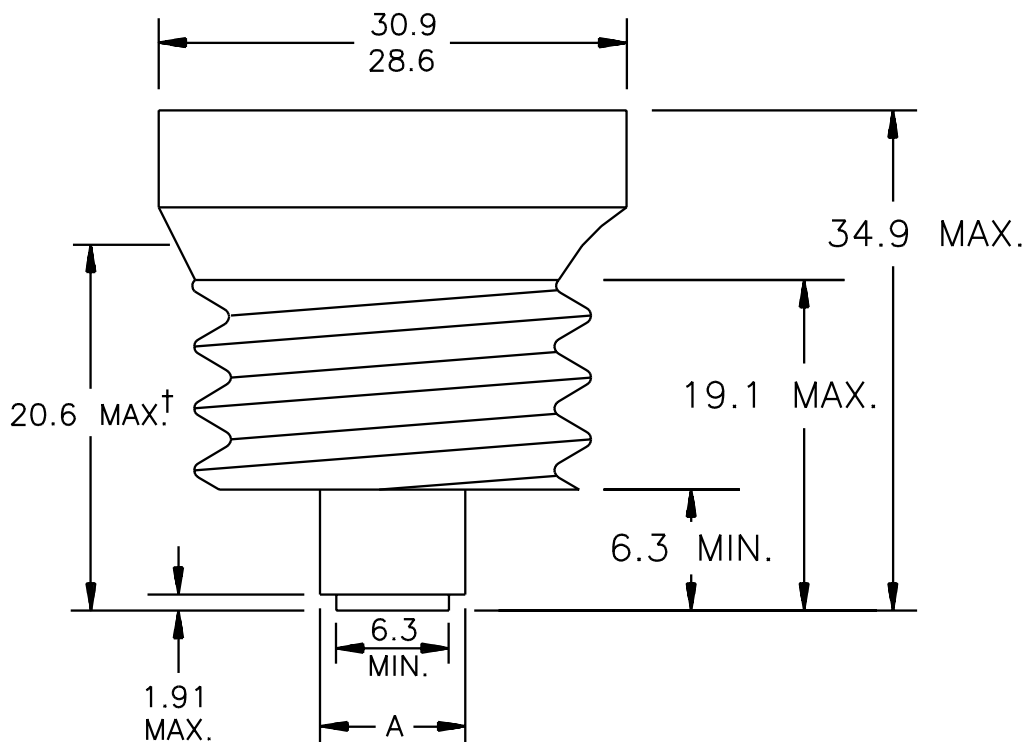
- c) voltage rating is optional;
- d) interrupting rating is optional;
- e) fuse classification is optional; and
- g) a plug fuse shall not be marked "Current Limiting."

In addition to the requirements in Part 1: A plug fuse rated 15 A or less shall have a prominent hexagonal feature. Fuses for Canada shall have a low melting point characteristic and shall be marked with a "P" or with a "D" for time delay.

## **7 Construction**

### **7.1 Dimensions**

Fuse dimensions are shown in Figures A and B.

**Figure A – Dimensions of Edison-base and Type C plug fuses in mm (in)**

† – Maximum extension of link

SB0589B

mm	In
28.6 – 30.9	1.12 – 1.22
34.9	1.37
20.6	0.81
19.1	0.75
6.3	0.25
1.91	0.075

Note: There shall not be less than three full threads (seven threads per 25.4 mm (1 inch)) in the screwshell. Edison-base may include a tapered configuration for dimension A.

Type	Rating	Diameter A
	Current $I_n$ , A	
Edison-base	0 – 30	19.1 (0.75) Max.
C	0 – 15	10.67 <sup>a</sup>
	16 – 20	12.45 <sup>b</sup>
	21 – 30	14.22 <sup>b</sup>

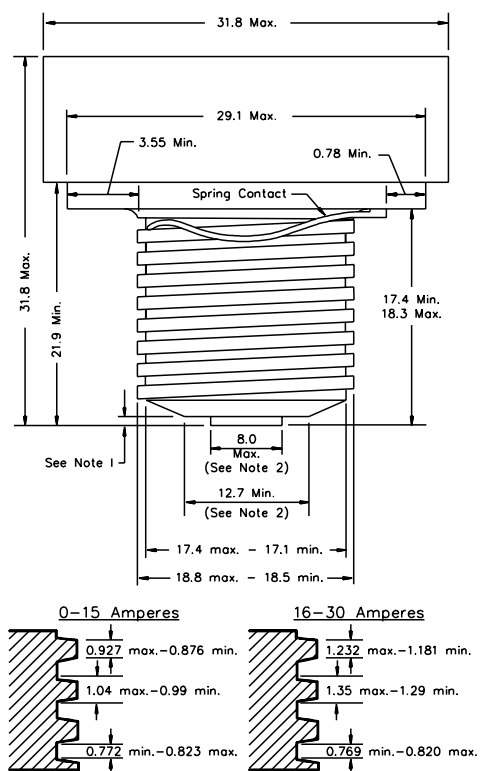
<sup>a</sup> Tolerance: +0.127 mm (+0.0050 in), -1.143 mm (-0.0045 mm)

<sup>b</sup> Tolerance: +0.127 mm (+0.0050 in), -0.127 mm (-0.0050 in)

<sup>c</sup> Tolerance: +1.143 mm (+0.0045 mm), -0.127 mm (-0.0050 in)



Figure B – Dimensions of Type S plug fuses in mm (in)



SB0592A

mm	In
31.8	1.25
29.1	1.14
3.55	0.140
0.78	0.031
21.9	0.86
17.4 – 18.3	0.68 – 0.72
8.0	0.31
12.7	0.50
17.4 – 17.1	0.68 – 0.67
18.8 – 18.5	0.74 – 0.73
0.927 – 0.876	0.0365 – 0.0345
1.04 – 0.99	0.041 – 0.039
0.722 – 0.823	0.0304 – 0.0324
1.232 – 1.181	0.0485 – 0.0465
1.35 – 1.29	0.053 – 0.051
0.769 – 0.820	0.0303 – 0.0323

Note 1: The thickness of the exposed portion of the center contact is 1.62 mm (0.064 in) minimum for the 16 – 20 A ratings and is 1.14 mm (0.045 in) maximum for the 21 – 30 A ratings.

Note 2: Applies to 21 – 30 A fuses only.

### 7.3 Connections

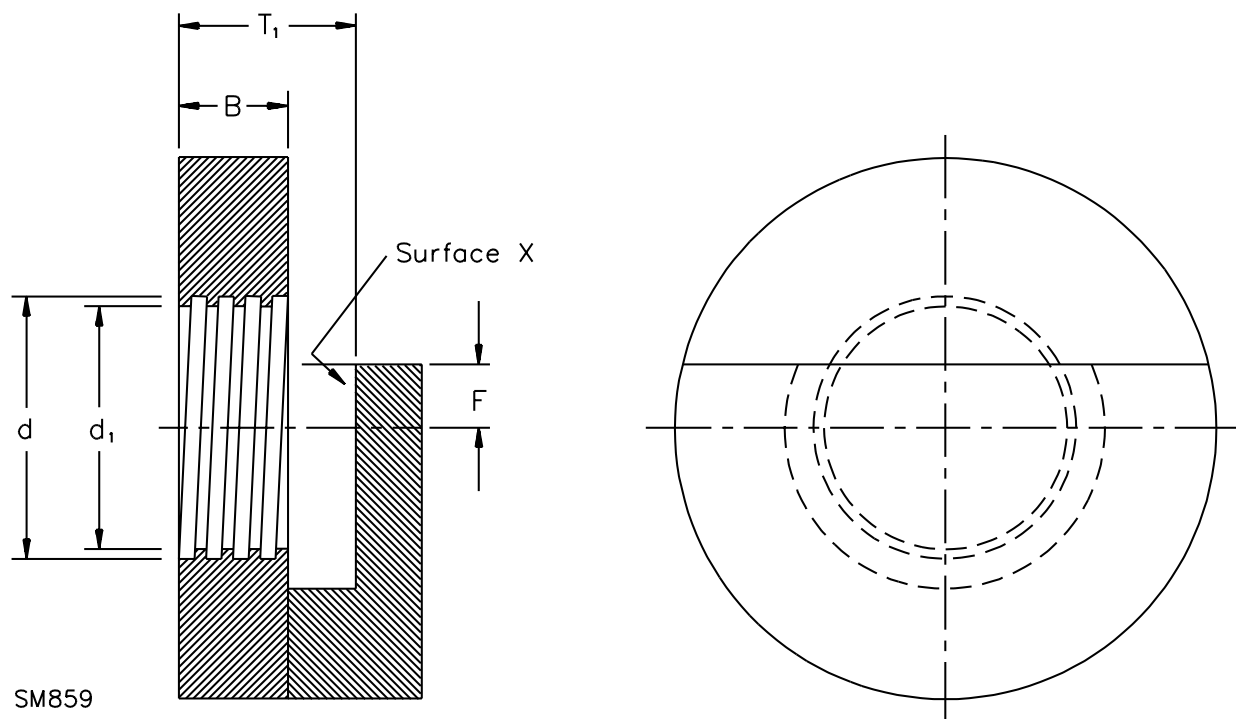
The design of a plug fuse shall be such that there are no exposed contact parts, or other live parts when the fuse is in the fuseholder.

#### 7.3.1 Edison-base and Type C plug fuses

The screwshell of a fuse shall be formed from brass or other suitable copper alloy not less than 0.20 mm (0.008 in) thick. The thickness after forming shall not be less than 0.165 mm (0.0065 in), measured on the flat surface of the bottom of the shell.

If the fusible element is externally soldered to the screwshell neither the fusible link nor solder shall extend more than 20.6 mm (0.81 in) above the plane of the center contact, and the solder shall not extend farther from the axis of the fuse than the farthest point on the screw shell.

The fuse shall fit the go gauge as shown in Figure C, and also shall not fit the no go gauge as shown in Figure D.

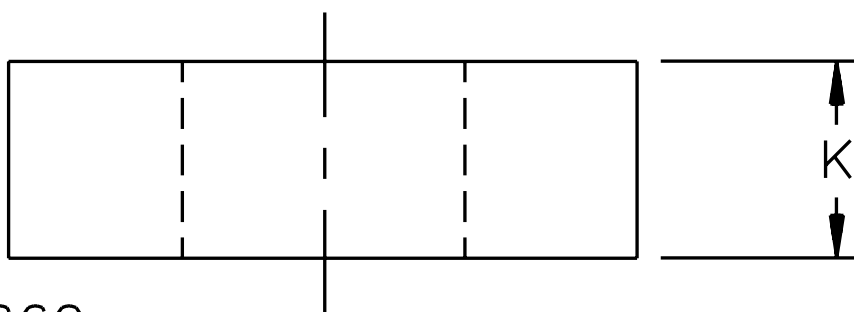
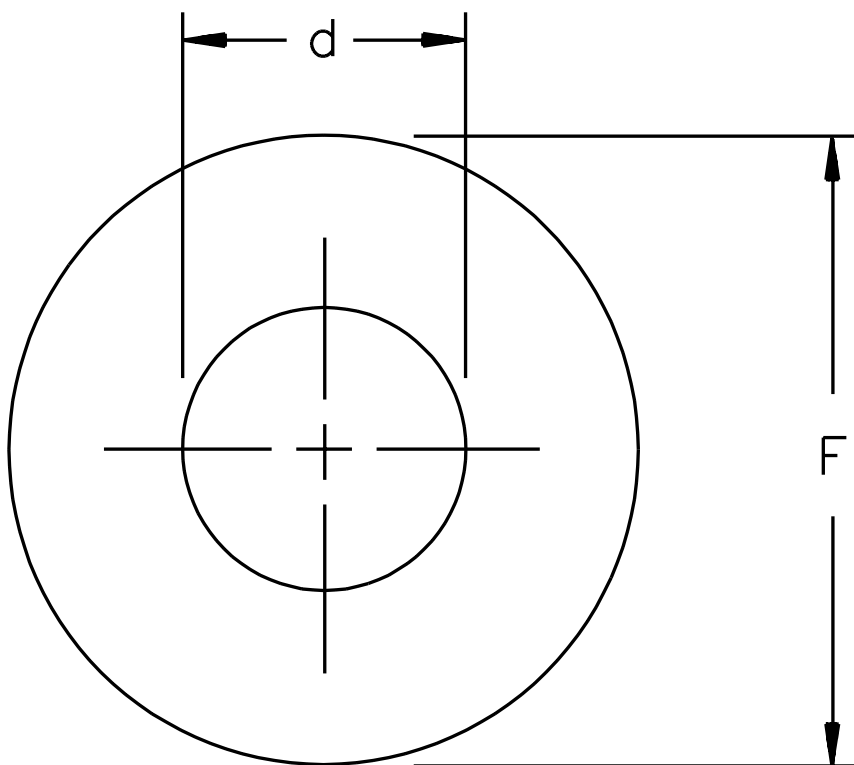
**Figure C – Threaded go gauge for Edison-base or Type C plug fuses in mm (in)**

Drawing Reference	Dimension		Tolerance	
B	10.67	(0.420)	$\pm 0.13$	( $\pm 0.005$ )
F	5.84	(0.230)	$\pm 0.13$	( $\pm 0.005$ )
T <sub>1</sub>	17.526	(0.6900)	+0, -0.025	(+0, -0.0010)
d	26.492	(1.0430)	-0, +0.013	(-0, +0.0005)
d <sub>1</sub>	24.816	(0.9770)	+0, -0.013	(+0, 0.0005)

Note 1: The form of the screw threads shall be in accordance with the dimensions shown on Standard Sheet 1-11-1 of ANSI Standard C81.10.

Note 2: This gauge is a modification of that shown on Standard Sheet 3-62-1 of ANSI Standard C81.10, for medium screw based lamps.

Figure D – No go gauge for Edison-base or Type C plug fuses in mm (in)



SM860

Drawing Reference	Dimension		Tolerance	
F	50.8	(2.00)	Approximate	
K	16.0	(0.63)	±0.13	(±0.005)
d	26.137	(1.0290)	+0, -0.013	(+0, -0.0005)

Note: This gauge is identical to that shown on Standard Sheet 3-63-1 of ANSI Standard C81.10, for medium screw based lamps.

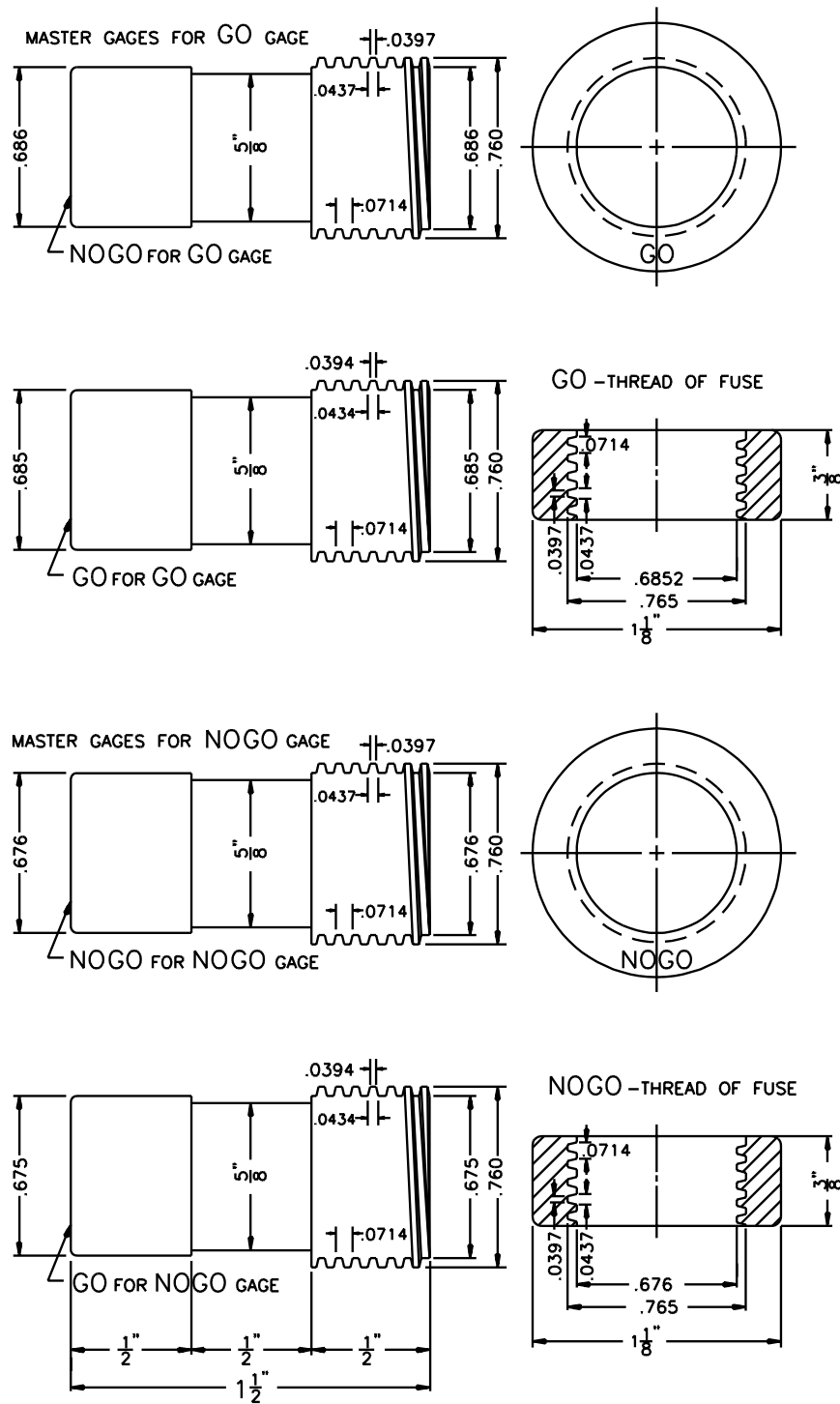
### 7.3.2 Type S plug fuses

The material for the threaded portion of a Type S plug fuse shall be of porcelain or an equivalent insulating material, and the spring contact shall be of copper alloy so designed and located that it will make electrical connection with the ring contact of the fuseholder for Type S fuses. This upper contact is required to have take-up action such that electrical contact, sufficient for the current rating, with the ring contact will be maintained when the center bottom contact of the fuse contacts the center contact of the fuseholder.

A fuse rated 0 – 15 A shall fit the go gauge, and also shall not fit the no go gauge as shown in Figure E.

A fuse rated 16 – 30 A shall fit the go gauge, and also shall not fit the no go gauge as shown in Figure F.

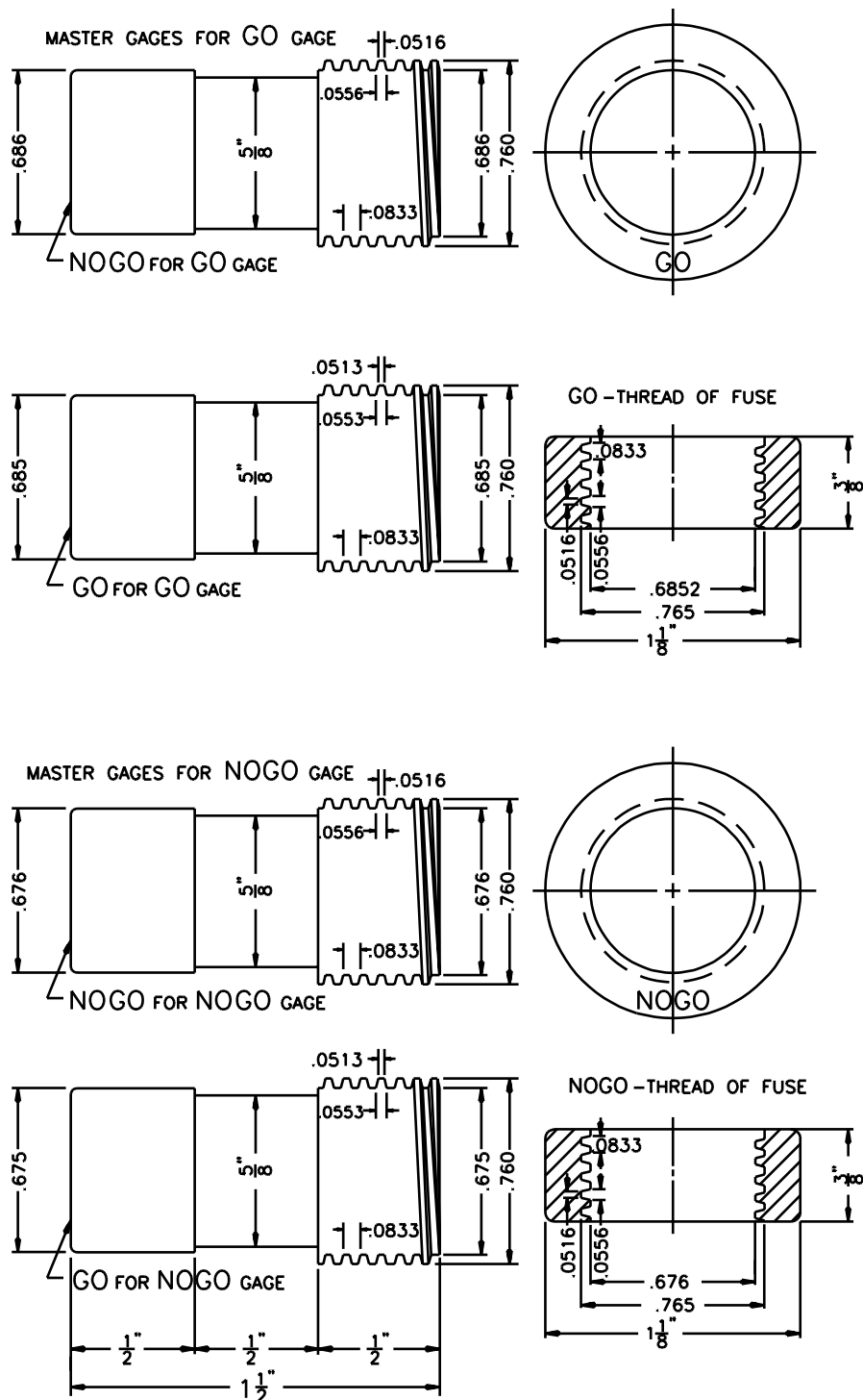
Figure E – Master gages and working gages for Type S fuses – 0 to 15 A – 14 pitch thread



SM406A

Note: All dimensions are in inches.

Figure F – Master gages and working gages for Type S fuses – 16 to 30 A – 12 pitch thread



Note: All dimensions are in inches.

## 8 Tests

### 8.2 Verification of temperature rise and current-carrying capacity

#### 8.2.3 Test method

1.0  $I_n$  – Temperature rise

1.1  $I_n$  – Current-carrying capacity,  $I_{nf}$

##### 8.2.3.1 Fuses rated 600 A or less

In addition to the requirements in Part 1: At the conclusion of the temperature rise test, the test current shall be increased without interruption to  $1.1 I_n$  for a period of not less than 15 min. Temperature is not monitored during this time.

#### 8.2.4 Acceptability of test results

In addition to the requirements in Part 1: The maximum temperature rise shall not exceed the following:

Body – 75°C

### 8.3 Verification of overload operation

Part 1, Table 4

Test 1 –  $1.35 I_n$

Test 3 –  $2 I_n$  (2 min maximum)

Test 4 –  $2 I_n$  (for time-delay fuses only)

### 8.4 Verification of operation at rated voltage

#### 8.4.2 Test circuit characteristics

For AC – Part 1, Table 5

Test 4c – 10 kA (power factor shall be 0.85 – 0.95)

For DC – Part 1, Table 6

Test 1 – Interrupting rating



## 9 Special tests

### 9.1 General

#### 9.1.1 Types of tests

The number of fuses to be tested are shown in Table 1.

**Table 1 – Number of fuses to be tested**

Test		Quantity
9.2	Verification of low melting point "P" ("D" for time delay) characteristic.	1
9.3	Verification of go/no go gauging requirements for Edison-base and Type C plug fuses	10
9.4	Verification of go/no go gauging requirements for Type S plug fuses	10

### 9.2 Verification of low melting point "P" ("D" for time delay) characteristic

9.2.1 The fuse shall open in an ambient of 200°C maximum when tested as specified in Clauses 9.2.2 and 9.2.3.

9.2.2 The fuse shall be placed in an ambient of 200°C maximum with a test current of 10 percent of rating maximum for a period of 6 h maximum. After the fuse opens it shall be allowed to cool to room temperature  $25 \pm 5^\circ\text{C}$  without being disturbed.

9.2.3 A test voltage shall be applied to the fuse and gradually increased from 0 V until rated voltage is reached or until the current exceeds 5 mA. The fuse shall be considered to have opened if the current between the fuse terminal parts does not exceed 5 mA when rated voltage is applied between such parts.

### 9.3 Verification of go/no go gauging requirements for Edison-base and Type C plug fuses

9.3.1 An Edison-base or Type C fuse shall be screwed into the "Go" gauge, Figure C, with a torque not exceeding 0.56 N·m (5 lbf·in). When fully inserted, the center contact shall be in contact with the Surface X.

9.3.2 The "No-Go" gauge, Figure D, shall be placed over the screwshell portion of the fuse tested in Clause 9.3.1 using a force, including the gauge weight, not exceeding 0.25 kg (0.55 lb). The center or bottom contact of the fuse shall not project beyond the opposite side of the gauge.

#### **9.4 Verification of go/no go gauging requirements for Type S plug fuses**

9.4.1 A Type S fuse shall be screwed into the "Go" gauge, Figure E or F, with a torque not exceeding 0.56 N·m (5 lbf·in). When fully inserted, the spring contact shall be in contact with the gauge.

9.4.2 The "No-Go" gauge, Figure E or F, shall be placed over the screwshell portion of the fuse tested in accordance with Clause 9.4.1 using a force, including the gauge weight, not exceeding 0.25 kg (0.55 lb). The center contact of the fuse shall not project beyond the opposite side of the gauge.