UL 198M

STANDARD FOR SAFETY

Mine-Duty Fuses

UL Standard for Safety for Mine-Duty Fuses, UL 198M

Fifth Edition, Dated April 4, 2018

Summary of Topics

This new edition of ANSI/UL 198M, Standard for Safety for Mine-Duty Fuses, is being issued to reaffirm approval as an American National Standard. No changes in requirements are involved.

The editorial reaffirmation updates are substantially in accordance with Proposal(s) on this subject dated February 16, 2018.

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Standard for Mine-Duty Fuses

First Edition – May, 1982
Second Edition – March, 1988
Third Edition – March, 1995
Fourth Edition – April, 2003

Fifth Edition

April 4, 2018

This ANSI/UL Standard for Safety consists of the Fifth Edition.

The most recent designation of ANSI/UL 198M as a Reaffirmed American National Standard (ANS) occurred on April 4, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages and Title Page.

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

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INTRODUCTION

1 Scope

1.1 These requirements cover Class K and Class R fuses having an additional D-C rating and that are intended for use in protecting trailing cables in D-C circuits in mines in accordance with the requirements of the United States Department of Labor, Mine Safety and Health Administration.

1.2 These fuses have a maximum current rating of 600 A, a voltage rating of 300 or 600 V dc, and an interrupting rating of 20,000 A dc.

2 General

2.1 In addition to the requirements in this standard, a fuse shall comply with all of the requirements for the respective fuse Class in:

a) The Low-Voltage Fuses – Part 9: Class K Fuses, UL 248-9; or

b) The Low-Voltage Fuses – Part 12: Class R Fuses, UL 248-12.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 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.

PERFORMANCE

5 General

5.1 Samples of the fuses are to be subjected to the D-C tests specified in Table 5.1.

Table 5.1
Tests and number of samples

Fuse rating, A	Test				
	200 percent rated current	300 percent rated current	900 percent rated current	10 ka	20 ka
0 – 200	2T, 3H		2T, 3H	2T, 3H	2T, 3H
201 and greater		2T, 3H	2T, 3H	2T, 3H	2T, 3H
T – Temperature Conditioning H – Humidity Conditioning					

5.2 Sets of fuses, 5 samples in each set, of the maximum rating of each case size are to be selected, one set for each of the four applicable tests specified in Table 5.1. If the internal features change at some intermediate rating in a particular fuse case size, this fact is to be considered and additional test sets are to be selected so that each construction is subjected to the complete test program.

5.3 Samples from each set are to be temperature and humidity conditioned prior to testing. A test is to be performed within one hour after removal of the samples for the test from the conditioning environment. The conditioning is to be as follows:

a) Temperature – Two samples from each set are to be conditioned in an air oven at 90 ±3°C (194 ±5.4°F) for a minimum of 24 hours.

b) Humidity – Three samples from each set are to be conditioned at a relative humidity of 95 ±5 percent at 25 ±5°C (77 ±9°F) for a minimum of five days.

5.4 At least three fuses from each set are to be tested in a fuseholder of the trolley-tap type. One fuse is to have been temperature conditioned and two fuses are to have been humidity conditioned.

5.5 A fuse not tested in a fuseholder of the trolley-tap type, is to be clamped in place or mounted, with or without clamps, in fuse clips spaced to fit the fuse, and tested in open air.

5.6 The test circuit is to consist of series connected inductors and resistors. An inductor is not to incorporate a ferromagnetic core.

5.7 The open circuit voltage for the test circuit is to be not less than 100 percent and not more than 110 percent of the rated voltage of the fuse.

Exception: A higher voltage may be used if agreeable to those concerned.

5.8 The test current is to be measured at the terminals of the fuseholder with the terminals short-circuited by a bus bar or other connection of negligible impedance.

5.9 The test current is to be determined by measuring the maximum displacement on an oscillogram at a time, after the start of current, of not less than 4 times the circuit time constant. Any overshoot above the time-current curve (exponential curve) is not to be considered. An ammeter (and shunt) may be used for currents up to 1800 A.

5.10 The time constant of the test circuit is to be as specified in Table 5.2.

Table 5.2
Circuit time constants

Minimum test current, A	Minimumtime contant, milliseconds
0 – 99	2
100 – 999	6
1000 – 9999	8
10,000 or greater	16

5.11 The time constant of the test circuit is the time when the current is 63.2 percent of the required test current.

5.12 If the current has a ripple, measurements are to be made from the midpoint of the ripple.

5.13 The test current is to be within plus 10, minus 0 percent of the required value.

Exception: Higher currents for the interrupting ability tests may be used if agreeable to those concerned.

5.14 Following each interruption, the tendency to restrike is to be monitored as outlined in 5.18. Monitoring is to be by an oscillograph.

5.15 For all tests, a fuse shall show only superficial damage. After the test, no fuse shall have:

a) One or more openings greater than 1/16 inch (1.6 mm), in any direction, in any metal part of the fuse.

b) One or more openings greater than 1/8 inch (3.2 mm), in any direction, in any nonmetal part of the fuse.

5.16 Following a test in a trolley-tap fuseholder, the fuseholder shall remain intact and shall readily accept and retain a replacement fuse. Separate trolley-tap fuseholders may be used for each test.

5.17 For the 200- and 300-percent tests, a fuse may be preheated on an A-C or D-C low-voltage circuit adjusted to 200- or 300-percent current, as appropriate, minus 0 plus 10 percent of rated current. The switchover time to the rated D-C voltage circuit is to be approximately 1 second and is to be completed before the start-to-arc occurs. If it cannot be determine that start-to-arc has occurred on the rated voltage D-C circuit using an ammeter, oscillographic records are to be used.

5.18 The recovery voltage is to be applied continuously across the fuse for 30 seconds after the initial current interruption – the point at which the current reaches zero value for the first time during the test. There shall be no oscillographic or other evidence – such as excessive smoking, audible venting of gases, or the like – of a tendency to restrike. If evidence of a restrike is noted, the recovery voltage is to be applied continuously for an additional 30-second time interval. If there is further oscillographic evidence of restrike, the results are unacceptable.

Exception: Evidence of restrike is permitted within 30 milliseconds after initial current interruption.