UL 218A

STANDARD FOR SAFETY

Battery Contactors for Use in Diesel Engines Driving Centrifugal Fire Pumps

UL Standard for Safety for Battery Contactors for Use in Diesel Engines Driving Centrifugal Fire Pumps, UL 218A

Third Edition, Dated February 26, 2004

Summary of Topics

This revision of ANSI/UL 218A is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS).

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

The requirements are substantially in accordance with Proposal(s) on this subject dated April 27, 2018.

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UL 218A

Standard for Battery Contactors for Use in Diesel Engines Driving Centrifugal Fire Pumps

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Third Edition

February 26, 2004

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through July 9, 2018.

The most recent designation of ANSI/UL 218A as a Reaffirmed American National Standard (ANS) occurred on July 9, 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 battery contactors for use in the starting systems of diesel engines driving centrifugal fire pumps, in accordance with the Standard for the Installation of Stationary Pumps for Fire Protection, NFPA 20.

1.2 These requirements cover battery contactors for use in starting systems rated 50 volts maximum.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components used in the products covered by this standard.

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required 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b) Is superseded by a requirement in this standard.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 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are 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.

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.

5 Glossary

5.1 For the purpose of this standard the following definitions apply.

5.2 BREAKAWAY CURRENT – The initial current supplied by the starting system to the diesel engine.

5.3 ROLLING CURRENT – The average current being supplied by the starting system to achieve a constant turning or ″rolling″ of the engine.

CONSTRUCTION

6 General

6.1 A battery contactor shall be formed and assembled so that it will have the strength and rigidity necessary to resist anticipated abuses encountered in the end-use without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

6.2 A battery contactor shall be provided with means to enable both manual and automatic operation.

7 Protection Against Corrosion

7.1 Iron and steel parts shall be protected against corrosion by enameling, galvanizing, sherardizing, plating, or other equivalent finish. This applies to all springs and other parts required for proper mechanical operation.

Exception No. 1: A bearing, and the like, need not have corrosion protection if such protection is impracticable.

Exception No. 2: A small part of iron or steel such as a washer, screw, bolt, and the like, that does not carry current need not have corrosion protection if the corrosion of such a part would not be likely to result in a risk of fire, electric shock, or injury to persons.

Exception No. 3: A part made of stainless steel that may be polished or treated need not have corrosion protection.

8 Provisions for Mounting

8.1 A battery contactor shall be provided with means for secure mounting to a supporting surface. A bolt, screw, or other part used to hold together component parts of a battery contactor shall not be used for securing the battery contactor to the supporting surface.

9 Insulating Material

9.1 Material for the support of uninsulated live parts shall be slate, porcelain, phenolic or cold-molded composition, or other material investigated for the support of such parts, and shall be able to withstand the most severe conditions expected to be met in service.

9.2 Insulating material, including barriers between parts of opposite polarity and material that may be subject to the influence of the arc formed by the opening of contacts, shall be investigated for the application.

10 Live Parts

10.1 A current-carrying part shall have the necessary mechanical strength and ampacity for its intended use, and shall be of metal or other material that is suitable for the application.

10.2 An uninsulated live part, including a terminal, shall be secured to its supporting surface by a method other than friction between surfaces so that it will be prevented from turning or shifting in position if such motion may result in reduction of spacings to less than those required elsewhere in this standard. A contact assembly shall be mounted so as to maintain alignment of contacts.

Exception: A pressure terminal connector need not be prevented from turning if no spacings less than those required result when the terminals are turned 30 degrees toward each other or toward other uninsulated parts of opposite polarity, or toward grounded metal parts.

11 Internal Wiring

11.1 The insulation on all internal wires of a battery contactor shall be rated for the voltage and the temperature conditions of use. It shall also be evaluated with respect to other conditions of service to which it is intended. Insulation shall be at least 1/32 inch (0.8 mm) thick if the internal wiring is subjected to movement, flexing, handling, or manipulation during its intended use, or during mechanical maintenance.

11.2 A wireway shall be smooth and free from sharp edges, burrs, fins, moving parts, or other surfaces that may cause abrasion of the insulation on conductors.

11.3 Unless covered by suitable insulating sleeving or tubing, a bare conductor, including pigtails and coil leads, shall be supported so that the spacings required elsewhere in this standard will be maintained.

11.4 All joints and connections shall be mechanically secure and shall provide electrical contact without strain on connections and terminals.

11.5 A splice shall be provided with insulation at least equivalent to that of the wires involved.

12 Wiring Terminals

12.1 A battery contactor shall be provided with wiring terminals for the connection of conductors supplying current to the starting system of the diesel engine and the conductors supplying current to the control circuit.

12.2 A fastening device, such as a stud, nut, bolt, spring or flat washer, or similar device, that is required for proper installation shall either be provided as part of the component terminal assembly, or mounted on or separately packaged with the battery contactor.

13 Coil Windings

13.1 A coil winding shall resist the absorption of moisture. This may be accomplished by impregnating, dipping in or brushing with varnish, or by other investigated means.

Exception: Film-coated wire is not required to be given additional treatment to prevent moisture absorption.

14 Spacings

14.1 The spacings in a battery contactor shall be 1/16 inch (1.6 mm) through air and over the surface of insulating material, between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part, or exposed metal part.

14.2 A vitreous-enamel or similar coating is not to be used as insulation in place of spacings.

14.3 In addition to, but not in place of, spacings required otherwise, if contact arms, blades, or similar parts remain connected to the starting system terminals with the battery contactor in the off position, the spacings from such parts in the off position to exposed dead metal parts that are isolated (insulated) shall not be less than 1/8 inch (3.2 mm).

14.4 Film-coated wire is an uninsulated live part in determining compliance with the spacing requirements in this standard.

14.5 An insulating barrier or liner used as the sole separation between uninsulated live parts and grounded dead metal parts, or between uninsulated live parts of opposite polarity, shall be a material that is suitable for the mounting of uninsulated live parts and shall not be less than 0.028 inch (0.71 mm) thick.

14.6 An insulating barrier or liner that is used in addition to an air space in place of the required through air spacings shall not be less than 0.028 inch (0.71 mm) thick. If the barrier or liner is vulcanized fiber, the air space shall not be less than 1/32 inch (0.8 mm). If the barrier or liner is of other material that has not been evaluated for the support of uninsulated live parts, the air space provided shall be investigated for the application.

Exception: A barrier or liner that is used in addition to not less than one-half the required spacing through air may be no less than 0.013 inch (0.33 mm) thick if the barrier or liner is of a material that is acceptable for the mounting of uninsulated live parts, has the necessary mechanical strength if exposed or otherwise likely to be subjected to mechanical damage, is reliably held in place, and is located so that it will not be adversely affected by operation of the battery contactor in service.

PERFORMANCE

15 General

15.1 The performance of battery contactors shall be investigated by subjecting a representative sample or samples in commercial form to the tests described in Sections 16 – 20. The electrical tests are to be conducted using a direct current source of supply and at a test potential at least equivalent to the voltage rating of the contactor.

16 Operation Test

16.1 The coil of a battery contactor shall operate to fully close the contacts when energized at 75 percent of its rated voltage, and shall maintain the contacts in the closed position when the voltage is then lowered to 50 percent of the rated value.

17 Overload Test

17.1 There shall be no electrical or mechanical breakdown of a battery contactor, no arcing to grounded or dead metal parts, nor any undue burning, pitting, or welding of the contacts, and the fuse between dead metal parts and the unswitched side of the supply (see 17.7) shall not open during the overload test described in 17.2 – 17.7.

17.2 The test is to be conducted by energizing and de-energizing the contactor coil to close and open the contacts. The test is to then be repeated, using the manual operator to open and close the contacts. The test using manual actuation may be conducted on a different sample than used for automatic actuation.

Exception: The test involving manual operation need not be conducted if it can be determined that the contact force and speed of actuation caused by movement of the manual operator is identical to the contact force and speed of actuation caused by energization and de-energization of the contactor coil.

17.3 A battery contactor is to be subjected to the duty cycle shown in Table 17.1 when operated automatically through the contactor coil. Each cycle is to consist of making and breaking a current equal to 1-1/4 times the breakaway current for which the device is rated. If required, the overload test is to be repeated with the contactor operated manually. In addition to the duty cycling shown in Table 17.1, the contactor shall successfully carry the rated breakaway current for 15 seconds without damaging the device.

Table 17.1
Overload test

Sequence number	Description
1	On 1 second, off 15 seconds
2	Repeat 1 five times (total of 6 cycles)
3	Off for 15 minutes
4	Repeat 1 – 3 four times (total of 30 cycles)

17.4 Except under the conditions specified in 17.5, a circuit in which the closed-circuit voltage is between 100 and 110 percent of the rated voltage is to be used for this test.

17.5 If the closed circuit voltage is not capable of being maintained at 100 percent of the rated voltage, the open-circuit voltage is be adjusted as much above the rated voltage as the closed-circuit voltage is below that value unless such adjustment results in the closed-circuit voltage being less than 90 percent of the rated value, in which case the test is to be conducted at a closed-circuit voltage equal to 90 percent of the rated value.

17.6 The load used for this test is to be a noninductive-resistive load.

17.7 During this test, all dead metal parts of the battery contactor are to be connected through a 30-ampere cartridge fuse of other than the time-delay type to the unswitched side of the supply.

18 Endurance Test

18.1 There shall be no electrical or mechanical breakdown of a battery contactor, no arcing to grounded or dead metal parts, nor any undue burning, pitting, or welding of the contacts, and the fuse between dead metal parts and the unswitched side of the supply (see 17.7) shall not open during the endurance test described in 18.2 and 18.3.

18.2 The sample or samples subjected to the Overload Test, Section 17, are to be used for this test.

18.3 A battery contactor is to be subjected to the duty cycle shown in Table 18.1 when operated automatically through the contactor coil. Each cycle is to consist of making and breaking a current equal to 1-1/4 times the rolling current for which the device is rated. If required, the endurance test is to be repeated with the contactor operated manually. The conditions for this test are to be as specified in 17.2 and 17.4 – 17.7.

Table 18.1
Endurance test

Sequence number	Description
1	On 15 seconds, off 15 seconds
2	Repeat 1 five times (total of 6 cycles)
3	Off for 15 minutes
4	Repeat 1 – 3 four times (total of 30 cycles)
5	On 15 seconds, off as long as necessary for sufficient cooling of the device
6	Repeat 5 969 times (total of 970 cycles)

19 Dielectric Voltage-Withstand Test

19.1 A battery contactor shall withstand, for 1 minute, without breakdown, the application of a 60-hertz essentially sinusoidal potential of 1000 volts between:

a) Uninsulated live parts and grounded or dead metal parts with the contacts opened and closed, and

b) Contact circuit and coil circuit parts, with the contacts closed.

19.2 A sample subjected to the Endurance Test, Section 18, is to be used for this test.

19.3 The sample is to be tested by means of a 500-volt-ampere or larger capacity transformer, the output voltage of which is essentially sinusoidal and is able to be varied. The applied potential is to be increased from zero to the required value at a substantially uniform rate and as rapidly as is consistent with its value being correctly indicated by a voltmeter. The potential is to be held at that value for 1 minute.

20 Mechanical Strength Test

20.1 The manually operated handle of a battery contactor shall withstand the test described in 20.2 without breaking or deforming to the extent that operation of the device is impaired.

20.2 The battery contactor is to be securely mounted as intended in service, but positioned so that the operating handle extends in a horizontal plane. A 300-pounds-mass (136 kg) weight is to be suspended from the end of the operating handle for 5 minutes.