

STANDARD INFORMATION

Standard Number: UL 347A
Standard Name: Standard for Medium Voltage Power Conversion Equipment
Standard Edition and Issue Date: 1st Edition Dated September 8, 2015
Date of Revision: June 27, 2017
Date of Previous Revision of Standard: September 8, 2015

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **January 4, 2020**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revised requirements.

Overview of Changes:

- Replacing references to UL 347B with references to UL 347.
 - Clarification of short circuit test requirements for bypass circuits
 - Capacitor discharge test in UL 347A.
 - Revisions to impulse testing when no isolating means is provided.
 - Revisions to operation tests.
 - Breakdown of components test – clarification of test method.
- Specific details of new/revised requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.



STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
11	Info	Protective Devices
11.10		When equipment is provided with <u>input</u> phase reversal protection, the protection shall operate on the reversal of the phase rotation in a polyphase circuit to cause and maintain the interruption of power in all of the circuit until the <u>phase reversal has been corrected</u> and the protection has been manually reset. <u>The protection shall comply with 37.7.</u>
11.14		Opening of a single fuse in a three phase circuit shall not result in application of single phase conditions to the motor for more than 30 seconds. <u>The equipment shall comply with 37.2.</u>
17	Info	Voltage Dividers
17.10		Equipment incorporating a voltage divider shall comply with all performance requirements of this standard, including power frequency withstand <u>dielectric voltage-withstand</u> and impulse tests, with the voltage divider installed as intended. <u>When voltage dividers are connected between medium voltage circuits and ground, the ground connection for the voltage divider shall be disconnected from ground during the dielectric voltage-withstand and impulse tests.</u>
21	Info	Capacitors
21.1		Other than as noted in 21.2, a means shall be provided to discharge each bus capacitor to a voltage level below 50 V dc within 1 minute. <u>See 39A for the capacitor discharge test.</u>
23	Info	Bypass Circuits
23.1	Info	Bypass contactors rated 15 kV and less
23.1.1		Other than as noted in 23.1.2, contactors used to bypass the converter and inverter portions of the controller (connecting the input directly to the output) shall comply with the requirements of the Standard for Medium-Voltage AC Contactors, Controllers, and Control Centers, UL 347. if rated 7.2 kV or less, or the Outline of Investigation for Medium Voltage Motor Controllers, up to 15kV, UL 347B, if rated more than 7.2 kV.
23.1.2		If the bypass contactor is interlocked and sequenced with the output section of the controller, such that the bypass contactor never makes or breaks motor current, the contactor need not comply with the overload test or the make and break capability test in the Standard for Medium-Voltage AC Contactors, Controllers, and Control Centers, UL 347. or the Outline of Investigation for Medium Voltage Motor Controllers, up to 15kV, UL 347B.
23.1.3		Unless previously investigated and rated for the short circuit withstand current rating of the equipment, bypass contactors shall be subjected to the short circuit test detailed in Section 33, Short Circuit Interruption Test. <u>Testing with reduced</u>



available short circuit currents as described in 33.2.18 shall not be allowed when testing the bypass contactor(s).

34 Info **Impulse Withstand Test**

34.1 Info **General**

34.1.2 The test sample shall be subjected to a sequence of tests in accordance with 34.1.3 or 34.1.4 using one of the test methods described in 34.2.

For equipment provided with an isolating means, The sequence of tests shall be as follows:

- 34.1.3
- a) For Test 1, the isolating means is to be closed, the medium-voltage motor circuit fuses and control circuit fuses are to be in place, and the test voltage is to be applied between the medium voltage input terminals and ground. For this test, all the input terminals are to be connected together, and all low voltage circuits are to be connected to ground during the test.
 - b) For Test 2, the isolating means is to be open and an impulse voltage of 110 percent of the rated impulse withstand voltage is to be applied in each phase individually between the contacts of the isolating means across the isolating gap. If the isolation means has provision for automatically grounding its load side when in the fully opened position, the test voltage is to be value specified under Test 1.
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New clause added;

34.1.4 For equipment that is not provided with an isolating means, only one test is required. In this case, the medium-voltage motor circuit fuses and control circuit fuses are to be in place, and the test voltage is to be applied between the medium voltage input terminals and ground. For this test, all the input terminals are to be connected together, and all low voltage circuits are to be connected to ground during the test.

37 Info **Operation Tests**

37.2 Info **Single phasing**

New clause added;

37.2.2 When fuses are used in three phase circuits, the equipment is to be operated with one fuse removed from the circuit. The fuse that is removed is to be the one located in the phase determined to be the one to which any protective circuits are the least responsive. The test is to be conducted by disconnecting the phase in which the fuse is located with the power conversion equipment operating at maximum normal load and is to be repeated by initially energizing the device with one fuse removed from the circuit. The output of the controller shall be monitored during this test, and the test shall not result in a single phase output to the motor for more than 30 seconds. This test is not required if the fuses are located in the input circuit, such that the test in 37.2.1 is also representative of the opening of a single fuse.



New clause added;

37.2.3 When three phase auxiliary or control circuits are intended to be supplied from an external source of supply, each three phase circuit shall be subjected to single phase testing similar to that described in 37.2.1 for the main power circuit.

New section added;

37.7

Input phase reversal

37.7.1

Polyphase equipment that is provided with input phase reversal protection is to be tested to demonstrate that the phase reversal protection functions. The test is to be conducted by energizing the device with the phase sequence of the input terminals reversed. The phase reversal protection shall cause and maintain the interruption of power in all of the circuit until the phase reversal has been corrected and the protection has been manually reset.

39

Info

Breakdown of Components Test

Components shall be evaluated one at a time. The breakdown of the component shall be simulated after the controller is fully energized and in operation. The test circuit shall remain energized, with the component breakdown maintained, until one or more of the following conditions occurs:

39.8

- a) A short circuit protection device opens to remove power from the equipment;
- b) A solid state protective circuit operates and provides a trip signal to cause a circuit breaker or other device to remove power from the equipment; or
- c) Thermal equilibrium is reached as determined by 30.2.3.

39A

New section added;

Capacitor Discharge Test

39A.1

The drive shall be connected to a source of supply at the maximum rated voltage until the bus capacitors are fully charged. There shall be no load connected and the drive shall be in the stopped condition. The voltage across the capacitor shall be monitored before and after removal of the supply power. Timing shall start upon removal of the supply power. The voltage monitoring device shall have an input impedance of not less than 1 MΩ. If the time to discharge to below 50 V is 1 minute or less, the drive is considered to comply with the requirements. If the time required to discharge to below 50 V exceeds 1 minute, marking and interlocking or voltage indication in accordance with 21.2 is required.

CUSTOMERS PLEASE NOTE: This Table and column "Verdict" can be used in determining how your current or future production is or will be in compliance with new/revised requirements.
