



Thank you for giving UL the opportunity to partner with you.

Inspections at your plant will be conducted by the Inspection Center in your vicinity. More information on Follow-up Service Inspections can be found at <https://www.ul.com/resources/follow-up-services-additional-resources>.

**PLEASE NOTE: YOU ARE NOT AUTHORIZED TO SHIP ANY PRODUCTS BEARING ANY UL MARKS UNTIL THE INITIAL PRODUCTION INSPECTION HAS BEEN SUCCESSFULLY CONDUCTED BY THE UL FIELD REPRESENTATIVE.**

**An Initial Production Inspection (IPI) is an inspection that must be conducted prior to the first shipment of products bearing the UL Mark. This is to ensure that products being manufactured are in accordance with UL's requirements including the Follow-Up Service Procedure. After the UL Representative has verified compliance of your product(s), authorization will be granted for shipment of product(s) bearing the appropriate UL Marks as denoted in the Procedure.**

Marks as needed may be obtained from UL Label Centers. To find a Label Center in your vicinity, visit <https://marks.ul.com/about/ul-listing-and-classification-marks/labels/label-centers>.

Please note, Follow-Up Procedure Revisions or Report Revisions do not include Authorization Pages, Indices, Section General, and/or Appendices unless revisions were required or requested.

Should you have any questions, after reviewing the material, or need to report any inaccuracies, please reach out to your UL representative or find UL contact details for your local Customer Service Department at <https://www.ul.com/about/locations>.

Please find attached the related material

For your convenience, the below describes the related updates:

Certificate of Compliance format now separates US and Canada certified Products by specified scheme and category.

For revised/new documentation, please reference 2021-10-08 in the page headings.

Volume(s) 1 Section(s) 1 were added.

E524704-Vol1-AuthorizationPage
E524704-vol1-RecCompMarkData
E524704-vol1-Index
E524704-vol1-InspectionInstructions

E524704-vol1-SectionGeneral
E524704-20211008-Description

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Times change, Trust Remains™

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FOLLOW-UP SERVICE PROCEDURE  
(TYPE L)WIRING HARNESSES - COMPONENT  
(ZPFW2, ZPFW8)

Manufacturer:	SEE ADDENDUM FOR MANUFACTURER LOCATIONS
Applicant:	1659762 (Party Site) Nicab Ltd Unit 7 Silverstone Park Silverstone NN12 8TJ GB
Recognized Company:	1659762 (Party Site) SAME AS APPLICANT

**Use of the Mark**

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party. The UL Contracting Party for Follow-Up Services is listed in the addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

It is the responsibility of the Applicant, Manufacturer(s), and Recognized Company to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

**Additional Responsibilities**

Additional responsibilities, duties and requirements for the Applicant and Manufacturers are defined under Additional Resources at the following web-site: <http://www.ul.com/fus>. Manufacturers without Internet access may obtain the current version of these documents from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of these documents or the Follow-Up Service Terms referenced below, please contact UL's Customer Service at <http://www.ul.com/aboutul/locations/>, select a location and enter your request, or call the number listed for that location.

**Acceptance of Follow-Up Services**

The Applicant and the specified Manufacturer(s) and any Recognized Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable service agreement is a Global Services Agreement ("GSA"), the Applicant, the specified Manufacturer(s), and any Recognized Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of a) use of the prescribed UL Mark, b) acceptance of the factory inspection, or c) payment of the Follow-Up Service fees. The Service Agreement incorporates such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking the following link: <http://services.ul.com/fus-service-terms>. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

**Use and Ownership of the Follow-Up Service Procedure**

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the Applicant, the specified Manufacturer(s), and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding

that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

**Definition of Terms**

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

**No Third Party Liability**

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

**Certification Body**

UL LLC has signed below solely in its capacity as the certification body to indicate that this Follow-Up Service Procedure fulfills the requirements for certification documentation issued by the certification body.

Bruce A. Mahrenholz  
Director  
Conformity Assessment Programs (CPO)  
UL LLC

LOCATION

1659762 (Party Site)  
Nicab Ltd  
Unit 7  
Silverstone Park  
Silverstone NN12 8TJ GB

Factory ID: None

UL Contracting Party for above site is: UL GmbH

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

RECOGNIZED COMPONENT MARK



Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

Recognized Component Marking Data Page (RCMDP)

(File Immediately After Authorization Page)

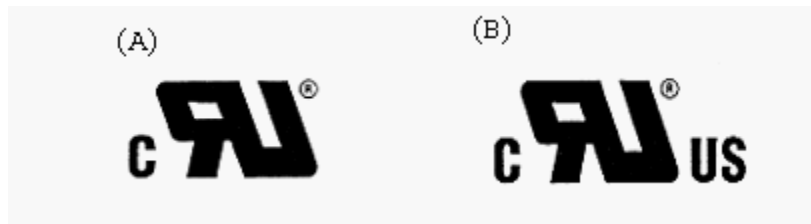
RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below:
  - (A) Recognized only to Canadian safety requirements, or;
  - (B) Recognized to both U.S. and Canadian safety requirements.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark



Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

## INDEX

Product	Section	USR	CNR
Wiring Harnesses	1	X	X

USR - United States Standard, Recognized

CNR - Canadian National Standard, Recognized

X - Indicates active



Subject 764

Melville, NY  
Issued: 2016-07-26  
Revised:

UL 817  
Wiring Harnesses (ZPFW2, ZPFW8)  
FOLLOW-UP AND INSPECTION INSTRUCTIONS

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## SCOPE

A. A wiring harness shall consist of an assembly of parts intended to make up part or all of the wiring of a single appliance. It is not intended that a complete product (such as a portable lamp) be labeled as a wiring harness.

An assembly consisting solely of a cord set, a UL Certified or non-certified power-supply cord (without strain relief or simple connectors), or a power-supply cord attached to a motor is not eligible for Recognition as a wiring harness. An assembly that employs Fiber Optic Cable and/or terminals shall not be covered under this category.

## GENERAL

B. As a part of UL's follow-up inspection, it is required that a Field Representative periodically visit the factory and select, for test or examination or both, samples of production made since the last inspection visit of the products covered.

C. The Follow-Up Service Procedure covering the product is loaned to the manufacturer and constitutes the basis on which the product is judged for compliance with the applicable requirements.

## GENERAL RESPONSIBILITIES OF THE MANUFACTURER AND THE FIELD REPRESENTATIVE

D. The Manufacturer's and Field Representative's general responsibilities, as part of the Follow-Up Services Procedure, are as noted in the published document titled, "UL Mark Surveillance Requirements", and is available through UL's secure customer portal MyHome@UL.com and/or through UL's internet site www.UL.com. Manufacturers that do not have Internet access may obtain the current version of these requirements from their local UL Customer Service Representative or UL Field Representative.

## RESPONSIBILITIES OF THE MANUFACTURER

E. The manufacturer shall produce a Recognized harness to comply with a diagram or written specification received or accepted by the end use manufacturer.

F. A wiring harness shall consist of an assembly as described in paragraph A of the scope.

G. A diagram or written description of the product is used in conjunction with the Follow-Up Service Procedure in determining compliance with the applicable requirements.

H. Typically, a harness diagram will contain direct requirements or specifications for the individual parts of the wiring harness. However, should the harness diagram or specification merely identify the various harness parts by a drawing or specification number, it will be necessary to review those secondary drawings or specifications (and any others to which they refer) until the Field Representative can determine all the requirements for the part being examined.

I. A product may vary from the diagram or drawing (containing hand written revisions) or specification if a letter of deviation is received from or written to the end use manufacturer by the harness manufacturer and the deviation letter is referenced back to the diagram number on the carton in which the harnesses are shipped.

J. With respect to I above, any additions or revisions will be identified by a revision number or letter. A copy of the documentation must be available to the Field Representative at both the harness manufacturer's facility and at the end product manufacturer's facility, where the harness will be used. The document identification number must be marked on the container, in which the harnesses are shipped, near the harness Recognition Mark and the manufacturer's identification; or a copy shall be included in the container.

#### GENERAL INSPECTION GUIDELINES

##### APPLICATION OF THE RECOGNITION MARK TO THE PRODUCT

L1 The Field Representative shall examine at least one sample of the products to verify that the application of the label to the product is in compliance with the requirements of UL.

L2 Wiring Harnesses are covered under UL's Type L Recognition Service and is identified by a Type L label, whose contents are described in the Section General of the Follow-Up Service Procedure. Additional information, such as camera ready art work and proportional dimensions for the Marks/Markings, may be found by visiting UL's website at "<http://www.ul.com/marks/>".

L3 The Recognized Company name, trade name, trademark or UL File Number (if authorized in the Follow-Up Service Procedure) that identifies the Recognized Company, must appear on the label, unless the subscriber chooses to purchase standard labels from UL's Label Centers, in which case the Recognized Company's identification is not on the UL Label but is placed elsewhere on the product.

##### MARKINGS

L4 The Field Representative shall ascertain that all markings are provided in accordance with the requirements.

L5 Each carton in which wiring harnesses are packed shall be marked or tagged to indicate the name of the manufacturer and shall include a diagram or equivalent description of the harnesses.

L6 In lieu of the diagram or description, a part number (or equal) of the wiring harness, marked on the carton or tag carrying the wiring harness label is considered the equivalent of a harness diagram or description provided that the diagram or description of the harness identified by this part number is available to the Field Representative at the factories of both the harness manufacturer and the harness user.

## RECOGNITION MARKS

L7 Recognition Marks are available in various denominations to cover the number of harnesses packaged in the carton or container to which the Recognition Mark is applied. The form designation is used to denote the complexity of the harness as follows:

Form 1-N - This Recognition Mark is used for harnesses consisting of four parts or less. Each piece of wire, fitting, splice, terminal block, wiring device, etc. is considered to be a part. Simple terminations of the eyelet, ring, open spade, or quick-connect types are not counted as a part when determining the form Recognition Mark to be used. The Form 1-N Recognition Mark may be used on a harness which employs a power-supply cord as one of the parts provided the power-supply cord was previously UL Certified as a power-supply cord.

Form N - This Recognition Mark is used for harnesses having more than four parts as described above. The harness may include as one of the parts a previously UL Certified power-supply cord.

## DATA SHEET

L8 The Field Representative shall record the wiring harness inspection data on Data Sheet 3000-418. Since Data Sheet 3000-418 is also used for other categories, only a portion of the complete Data Sheet will be used. A copy of the completed data sheets shall be retained at the manufacturer's location or the IC until the next inspection visit or 90 days, whichever is longer.

## FIELD REPRESENTATIVE'S COUNTERCHECK PROGRAM

L9 At each visit to the factory, the Field Representative shall see the entire lot of wiring harnesses, which bear or are intended to bear the Recognition Mark and shall then select random samples. The Field Representative shall consider a lot as composed of products of a single type, grade, class, size and composition, manufactured under essentially the same conditions and during essentially the same production run. The inspection lot may be of any size. The samples are to be reviewed in accordance with these instructions and the special instructions (if any) in the Follow-Up Service Procedure.

L10 The Field Representative shall check the performance requirements and construction details of the wiring harnesses, including UL Certified Components. The Field Representative is required to perform visual examination and witness tests as indicated on the following pages. It is not required that the Field Representative witness tests that are specified on the wiring harness diagram, unless such tests are part of the follow-up program (Table L1), but the Field Representative shall confirm that the manufacturer is conducting such tests.

L11 The Field Representative is required to select, inspect and report upon samples proportionate to the output of the factory as far as the styles, types, or catalog numbers produced. The test to be conducted and the actual number of samples to be selected shall be in accordance with the following.

L12 A Recognized harness consisting of a UL Certified power-supply cord to which a molded part such as strain relief, swivel connector, etc. is added, shall be subjected to the tests in Table L1 on the added fittings.

L13 Representative samples of fittings, terminations, splices, and other special constructions used in a harness may be tested prior to assembly in the harness in order to prevent the destruction of a complete harness during test.

L14 Terminations that are applied to conductors by welding or soldering, do not require "Terminations - Reliability of Connections Test" (see paragraph L52). Other connections shall be subjected to this test only when the wiring diagram or specification so indicates.

L15 Select five samples from each crimping machine applying terminations and subject them to the test described under "Terminations-Reliability of Connections". If three or more samples from any machine fail the test, the manufacturer shall stop production of that machine until it is readjusted to properly crimp the fittings. If failures are encountered on one or two of the samples, select three additional samples from the same machine. If no additional failures are found, accept production of the machine. If any of the additional samples fail, reject production of the machine until machine is readjusted to crimp joint properly. The manufacturer shall determine proper adjustment by conducting the test on five samples with no failures.

L16 Reference should also be made to Procedure, Vol. 1C or other numeric numbered Vol. of this file with regard to special instructions, if any, concerning components.

L17 All failures to comply with the provisions of the indicated diagram or specification (including secondary prints or specifications) or to the test required by Table L1 shall be called immediately to the attention of the manufacturer and confirmed in writing by means of a Variation Notice.

#### Form N and 1-N Harnesses

L18 Select one representative sample of each harness being produced at time of inspection and inspect the harness for compliance to the diagram or specification referenced on the carton in which the harnesses are shipped.

L19 Wire and Parts, including simple terminations such as eyelet, ring, open spade or quick connect devices, are not required to be UL Certified unless so specified on the wiring harness diagram.

L20 There may be instances where Non-UL Certified items may be used in a Recognized end product. A harness with such components may bear the UL Recognition Mark as long as it complies with the wiring diagram or specification sheet.

## Visual Examination

L21 The Field Representative shall perform the visual examinations as outlined in the Manufacturer's Program, Table L1, and in accordance with the Sampling Program in L49.

L22 The Field Representative shall witness wiring harnesses being assembled. Observation of the methods employed in stripping wires, fastening insulation and braids, and attaching conductors to wiring terminals shall be part of the general review of the product.

## Mechanical and Electrical Tests

L23 Mechanical and Electrical tests shall be performed by the manufacturer and witnessed by the Field Representative as described in the Manufacturer's Program, Table L1. Samples to be subjected to these tests by the manufacturer and witnessed by the Field Representative are to be selected by the Field Representative according to the "Sample Selection Procedure" (Para. L42 below.

## MANUFACTURER'S TEST PROGRAM

L24 Table L1 outlines the manufacturer's Follow-Up control requirements for testing and visual examination of wiring harnesses. Samples for testing, listed in Table L1, shall be selected from a lot, defined as products of a specific type, grade, class, size, and composition, manufactured under essentially the same conditions, and during a single continuous production run.

L25 The frequency of testing will be reduced or increased in accordance with UL's evaluation of the product's design configuration and/or effectiveness of the manufacturer's control of quality, relative to product safety.

L26 The classifications of defects A and B, enumerated in Table L1, indicate the seriousness of defects as regards to product safety; A is more serious than B (a defect is a nonconformance of product, relative to follow-up requirements). A unit of product is classified as Class A defective when it contains one or more Class A defects and may also contain one Class B defect. A Class B defective unit of product contains a Class B defect(s) only.

NOTE: The Field Representative's sampling plan reflects Classes A and B defects in accept/reject decisions.

L27 The manufacturer shall maintain the following records of the control program:

- a. Catalog number or model number
- b. Number of units tested and inspected
- c. Type of tests and inspections
- d. Data and results of tests and inspections
- e. Number of rejects
- f. Failure analysis
- g. Corrective action

L28 The Manufacturer's Testing and Inspection Program outlined in the following pages applies only to that portion of the wiring harness that is not a part of a UL Certified power supply cord.

<b>TABLE L1</b>				
<b>MANUFACTURER'S FOLLOW-UP CONTROL REQUIREMENTS FOR WIRING HARNESSES EMPLOYING CORD CONNECTORS, CRIMPS OR OTHER FEMALE FITTINGS</b>				
2 Wire	3 Wire	Test and Inspection	Class of Defect	Manufacturer's Testing and Inspection Program
<b>GROUP I Mechanical Testing</b>				
X	X	Reliability of connection (to contact#)	A (see Note 1)	Sampling Program (see Para. L29, L30)
X	X	Security of insulation	A	First piece inspection (see Para. L31)
X	X	Strain relief	A	First piece inspection (see Para. L31)
# Also includes Reliability of Other Terminations on wiring harnesses when specified on diagram.				
<b>GROUP II - Visual Examination - Applicable to All Harnesses</b>				
X	X	Marking	B	Monitoring Program (see Para. L32)
X	X	Damage to cord insulation	A	Monitoring Program (see Para. L32)
X	X	Fastening of Insulation	A	Monitoring Program (see Para. L32)
X	X	Wiring	B	Monitoring Program (see Para. L32)
X	X	Overall length of cord	B	Monitoring Program (see Para. L32)
X	X	Type of cord	B	Monitoring Program (see Para. L32)
X	X	Type of fittings	B	Monitoring Program (see Para. L32)
X	X	Terminations	See note 8	Monitoring Program (see Para. L32)



2 Wire	3 Wire	Test and Inspection	Class of Defect	Manufacturer's Testing and Inspection Program
		<b>GROUP III - Electrical Testing - Check the individual test method under "Tests to be Conducted" section in this FUII for applicability</b>		
X	X	Continuity of line	A (See Notes 3, 7 and 6)	100 Percent Electrical Testing Program or Alternative Described in Procedure (see Para. L33)
-	X	Continuity of grounding conductor	A (See Note 3)	100 Percent Electrical Testing Program or Alternative Described in Procedure (see Para. L33)
X	X	Continuity of grounding conductor	A (See Notes 3, 7)	100 Percent Electrical Testing Program or Alternative Described in Procedure (see Para. L33)
X	X	Polarization	A (See Notes 3)	100 Percent Electrical Testing Program or Alternative Described in Procedure (see Para. L33)
X	X	Dielectric Withstand	A (See Notes 4, 6 and 7)	100 Percent Electrical Testing Program or Alternative Described in Procedure (see Para. L33)
X	X	Insulation resistance of molded fittings	A (See Notes 5)	Five Samples Per Lot (see Para. L33)

## NOTES TO TABLE L1

Note 1 - Reliability of Connection to Contact - In lieu of the requirements stipulated the manufacturer may elect to use a 24 lb. (10.8 kg) weight for 10 sec on conductors of No. 18 AWG or larger and a 10 lb. (4.5 kg) weight for 10 sec on conductors of smaller AWG.

Note 2 - Deleted.

Note 3 - Any suitable indicating device, such as an ohmmeter, battery-buzzer circuit, or equivalent, may be used.

- Note 4 - Dielectric Withstand - In lieu of the requirements stipulated manufacturer may elect to substitute any of the following for the A.C. test potential specified:
- a) a 1500 volt A.C. test potential applied for one (1) second,
  - b) a 1770 volt D.C. test potential applied for one (1) minute,
  - c) a 2100 volt D.C. test potential applied for one (1) second.
  - d) A 1250 volts A.C. test potential applied for one (1) minute.
- Note 5 - This test is applicable to rubber and similar materials of any color and to other materials if they are colored gray or black.
- Note 6 - In addition to those constructions specified in Note 7, this test is to be conducted on wiring harness designs curling iron swivel connector assemblies.
- Note 7 - This test applies to all wiring harnesses employing UL Certified power supply cords with other assembled on fittings.
- Note 8 - There shall be no stray or cut strands after the installation of terminals.

#### SAMPLING PROGRAM - RELIABILITY OF CONNECTION TEST

##### Sample Selection Procedure

L29 In accordance with Table L1, the manufacturer shall start the CONTROL PROGRAM on normal inspection: select sample of either (8) units per shift for a first piece inspection and one unit per hour for remainder of shift. As specified in Table L2 below, the switching procedure may be applied to change the sample size to three (3) units for reduced inspection. For reduced inspection, select sample units as follows: a first piece inspection and one unit after each three-hour interval. The tests are to be conducted on each unit of the sample and, preferably, approximately in the order shown in Table L1. If, during the testing a unit of the sample is rendered unusable by physical separation of any parts, testing of that unit shall be discontinued, the unit shall be recorded as defective, and no replacement will be added to the sample.

TABLE L2			
SAMPLING PLAN			
Inspection Level	Sample Size	Acceptance and Rejection Number for Defectives	
		Ac	Re
Normal	8	0	1
Reduced	3	0	1
Ac - Acceptance number			
Re - Rejection number			

Switching Procedures

- L30 a. Normal to Reduced - Normal inspection shall be changed to reduced inspection when ten (10) consecutive shift inspections have been acceptable on first inspection.
- b. Reduced to Normal - Reduced inspection shall be changed to normal inspection if any of the following conditions occur: (1) one sample is rejected on a first inspection (2) notification from UL due to nonconforming test results (3) other conditions warrant that normal inspection be applied.

SAMPLING PROGRAM - TESTING AND INSPECTION, OTHER THAN RELIABILITY OF CONNECTION TEST

L31 For mechanical testing (Table L1, Group I) first piece inspection shall be performed when there is a change of lot (defined in paragraph L2), shift, machine setup or mold.

L32 The manufacturer shall have a manufacturing and quality control system which will assure that production is properly monitored for construction features covered by visual examination (Table L1, Group II).

L33 The manufacturer shall adjust the frequency of the electrical testing program of Table 1, Group III to one of the following test programs on a daily basis:

- a. 100 percent electrical testing program given in Table L1 under Group III.
- b. When 150 successive assemblies have been found to be free of defects, sampling at the frequency of one assembly in 200 on a production basis, shall be established. Sampling at this frequency is to be continued until an assembly with a defect is found. At that point, the appropriate test shall be resumed and continued until 150 successive assemblies have again been found to be defect-free.
- c. The alternate program described in the Follow-Up Service Procedure.

Procedure in the Event of a Nonconformance

L34 If a nonconformance is encountered during the manufacturer's testing program, the procedure detailed below shall be followed by, the manufacturer:

- a. Segregate and hold production since last acceptable sample and make notation in records detailing type of nonconformance; results may be entered as pass/fail.
- b. Perform corrective action analysis to determine cause of nonconformance, corrective action to be taken and extent of production affected.
- c. Develop and implement a corrective action plan.
- d. Select five (5) additional samples for retest of nonconformance.
- e. If all additional samples pass, release held production.
- f. If any of the additional samples show nonconforming results, repeat steps "a" through "e" above by selecting a second sample.
- g. If the second sample obtains nonconforming results, the procedure outlined in paragraph L35 shall be followed.

L35 If a second sample obtains any nonconforming results the affected production shall remain segregated and may not be shipped bearing the UL Certification Mark.

TESTS TO BE CONDUCTED

ON MOLDED-ON Non-standard(non-NEMA and non-IEC)Cord Connectors

L36 RELIABILITY OF CONDUCTOR CONNECTIONS TEST

Method

When a conductor is assembled to a contact of a connector prior to its assembly into the body of a device, each connection shall withstand for 1 min without breaking, a pull as follows:

18 AWG and Larger	20 lb.
20 AWG	8 lb.
22 AWG	8 lb.
24 AWG	6 lb.
26 AWG	4 lb.
28 AWG	2 lb.
30 AWG	1 lb.

During this test, the angle between the contact and the conductor is to have the same value as in the completely assembled combination. A splice connector is to be tested conductor-to-conductor with the splice connector between. The test shall be performed by using dead weights or, at the manufacturer's option, a power-driven tensile testing machine. If a tensile testing machine is used, it shall have jaws suitable for holding the specimen and capable of applying the minimum required tensile load to the specimen while separating at a uniform rate not exceeding 1 in/min. (25 mm/min). The machine shall be equipped with a scale from which the load can be read to a value of 0.1 lbf (0.4 N). The accuracy of the scale shall be within 2 percent of the value read, and weight standards shall be provided for calibrating the machine.

#### Basis for Acceptability

The conductor shall not separate from the connector or contact.

### L37 SECURITY OF INSULATION TEST

#### Method

A braidless type parallel cord which has a nominal insulation thickness of less than 4/64 in. (1.58 mm) (Types HPN, SP-1, SP2, SPT-1, and SPT-2) shall be so secured within a plug or connector that the insulation will be prevented from slipping away from the body of the fitting. Unless the security of the conductor insulation is insured by a knot in the cord inside the cap, or by an equivalent positive means, the assembly shall be capable of withstanding a direct pull of 15 lb (6.8 kg) for 2 min.

The conductor insulation of each conductor of the cord is to be split, parallel to the conductor for a short distance at a point approximately 1 in. (25.4 mm) from its entry into the cap, and all strands of the conductor and the separator (if any) are to be severed at the slit portion. With the fitting securely held, a direct pull of 15 lb (6.8 kg) is to be applied for a period of 2 min at the free end of the cord.

Exception: When the conductor insulation on Type HPN flexible cord is seated 3/8 inch (9.5 mm) minimum inside the fitting after molding, the length of cord is to be 10-12 inches (254-305 mm) long. The slit in the insulation is to be made approximately 6 inches (152 mm) from the entry into the fitting, and all strands of the conductor and the separator (if any) are to be severed at the slit portion. With the fitting securely held, a direct pull of 15 lb. (67 N or 6.8 Kgf) is to be applied for a period of 2 minutes at the free end of the cord.

#### Basis for Acceptability

The insulation shall not detach from the fitting. There shall be no exposed bare conductors at the entry into the fitting.

L38 STRAIN RELIEF TEST (INTEGRITY OF ASSEMBLY TEST)

## Method

Strain relief shall be provided such that a pull exerted on the cord or wire will not be transmitted directly to the terminals of a fitting. To determine that the fitting complies with the strain relief requirements, a sample of the fitting is to be subjected to a straight pull as follows:

18 AWG and Larger	30 lb.
20 AWG	20 lb.
22 AWG	10 lb.
24 AWG	8 lb.
26 AWG	6 lb.
28 AWG	4 lb.
30 AWG	2 lb.

The pull shall be applied while the fitting is securely held. A pull as specified above, is to be applied for 1 min, to the flexible cord or wire, in a direction normal to the plane of the cord entry hole for a device other than a through-cord switch. A through-cord switch assembly is to be tested cord-to-cord with the switch between.

The test shall be performed by using dead weights or, at the manufacturer's option, a power-driven tensile testing machine. If a tensile testing machine is used, it shall have jaws suitable for holding the specimen and capable of applying the minimum required tensile load to the specimen while separating at a uniform rate not exceeding 1 in/min (25 mm/min). The machine shall be equipped with a scale from which the load can be read to a value of 0.1 lbf (0.4 N). The accuracy of the scale shall be within 2 percent of the value read, and weight standards shall be provided for calibrating the machine.

## Basis for Acceptability

There shall be no detachment of either conductor of the cord or wire from the terminal.

L39 DIELECTRIC VOLTAGE-WITHSTAND TEST

## Method

Harnesses incorporating a UL Certified power-supply cord with additional fittings having three or more conductors and harnesses incorporating cord connector bodies molded on flexible cord or appliance wiring material shall be tested. They shall be capable of withstanding without breakdown for 1 min the application of a 60 Hz sinusoidal potential of 1250 v between any two conductors. For an alternate production line test time and voltage see Note 4, Table L1.

## Basis for Acceptability

There shall be no dielectric breakdown.

L40 INSULATION RESISTANCE TEST

Required on molded fittings made of rubber and similar materials of any color. Other materials are to be tested if they are colored gray or black. Fittings that are part of a UL Certified power supply cord or cord set need not be tested.

## Method

Unless otherwise permitted in the individual procedures, the insulation resistance is to be measured by a magneto megohmmeter or electronic megger that has an open-circuit input of 500 V. A quantity of No. 7 lead drop shot (approximately 0.10 in. diameter) or aluminum foil is to be placed in an open top container. Cord holes or other openings through which the shot can enter shall be plugged with insulating material. The device is to be immersed in the shot in contact with the test surface. As an alternative to the lead drop shot, metal foil shall be used. The foil is to be formed onto and tightly wrapped on the surfaces of the fitting other than the fitting face. All parts are to be kept for at least 48 hr at room temperature before being subjected to this test.

Five samples from each shipment of molded parts received shall be tested. If molding is performed "in-house", the same number of samples shall be selected whenever a new lot is introduced into the molding process.

If the shipment of a production lot cannot be delayed for performance of the insulation resistance test, the test shall be performed by the manufacturer as soon as possible after the samples are kept at room temperature for 48 hr.

## Basis for Acceptability

The insulation resistance shall be no lower than 100 megohms between:

- a. Live parts of opposite polarity.
- b. Live parts and dead metal parts which are exposed to contact by persons or which may be grounded in service.
- c. Live parts and any surface of insulation material which is exposed to contact by persons or which may be in contact with ground in service.

TERMINATIONS

L41 RELIABILITY OF CONNECTIONS TEST (Not applicable for UL Certified power supply cords used in the assembly of the wiring harness)

## Method

Terminations (including those insulated by recognized insulating tubing which is heat-shrinkable, chemically diluted, or secured in place by a head-bonding process) such as crimped-on closed-loop, open-end spade type, male or female quick-disconnect type is to be subjected to a pull test. The pull is to be applied between the conductor and its terminal. Constructions using more than one conductor in a crimp connection shall be tested by applying the pull between each conductor and the terminal. The pull shall be as follows:

18 AWG and Larger	20 lb.
20 AWG	8 lb.
22 AWG	8 lb.
24 AWG	6 lb.
26 AWG	4 lb.
28 AWG	2 lb.
30 AWG	1 lb.

The pull shall be applied for 1 min. The test shall be performed by using dead weights or, at the manufacturer's option, a power-driven tensile testing machine. If a tensile testing machine is used, it shall have jaws suitable for holding the specimen and capable of applying the minimum required tensile load to the specimen while separating at a uniform rate not exceeding 1 in/min (25 mm/min). The machine shall be equipped with a scale from which the load can be read to a value of 0.1 lbf (0.4 N). The accuracy of the scale shall be within 2 percent of the value read, and weights shall be provided for calibrating the machine.

## Basis or Acceptability

There shall be no separation of connections.



FIELD REPRESENTATIVE SAMPLING PROGRAM

Sample Selection Procedure

L42 From each lot to be inspected, the Field Representative shall select thirteen (13) units when on normal inspection, twenty (20) units when on tightened inspection, and five (5) units when on reduced inspection. (See Table L3). The tests described in Table L1 are to be conducted on each sample. If, during the testing, any sample is rendered unusable by physical separation of any parts, testing of that sample shall be discontinued. The unusable sample shall be classified as Class A or B defective in accordance with L26.

<b>TABLE L3</b>					
<b>SAMPLING PLAN</b>					
Inspection Level	Sample Size	Acceptance and Rejection Numbers for Class of Defectives#			
		Class A		Class B	
		Ac	Re	Ac	Re
Normal	13	0	1	1	2
Tightened	20	0	1	1	2
Reduced	5	0	1	0	1
#See Table L1 for description of defects.					
Ac - Acceptance number					
Re - Rejection number					

L43 Upon completion of the testing and examination, the number and class of the defects in the sample are determined. If the number of defects of each class found in the sample is equal to or less than the acceptance number for that class, the lot is acceptable. If the number of defects of each class is equal to or greater than the rejection number for that class, the lot shall be rejected. If a lot is rejected, the manufacturer may make a thorough review of the lot, culling all assemblies which do not comply with the requirements. The remainder of the lot may be resubmitted for inspection under a tightened inspection level for those items previously found as defects in the lot.

L44 The Field Representative shall require that the manufacturer remove Recognition Marks from all individual defectives, and wiring harnesses in rejected lots, as defined above, except for culled and resubmitted portions found to be acceptable.

L45 The Field Representative shall select a representative sample of production to determine that the product complies with the requirements of the Follow-Up Service Procedure.

L46 Normal inspection shall initially be established unless otherwise directed. A change to a Tightened or Reduced inspection schedule shall be based on the following.

## Change in Inspection Level Procedures

L47 A change in inspection level may be considered as follows:

- A. Normal to Tightened - When normal inspection is in effect, tightened inspection shall be instituted when two out of five consecutive lots have been rejected on original inspection (i.e., ignoring resubmitted lots for this procedure).
- B. Tightened to Normal - When tightened inspection is in effect, normal inspection shall be instituted when five consecutive lots have been acceptable on first inspection.
- C. Normal to Reduced - When normal inspection is in effect, reduced inspection shall be instituted providing that the preceding ten lots have been on normal inspection and none has been rejected on first inspection, the total number of defectives in the samples from the preceding ten lots is equal to or less than the applicable number given in Table L3.
- D. Reduced to Normal - When reduced inspection is in effect, normal inspection shall be instituted if any of the following occur on original inspection; a lot is rejected, or a lot is considered acceptable but contained one Class B defective, or other conditions warrant that normal inspection shall be instituted.
- E. Discontinuance of UL Recognition - When ten consecutive lots of a particular style or construction detail are found while on tightened inspection, Recognition shall be suspended for the style or construction. No labeling of the suspended style or construction is permitted. A corrective action plan must be submitted by the manufacturer for review by UL. Reinstatement of UL Recognition will be determined by UL along with determining the inspection schedule level.

GENERAL

PRODUCT COVERED:

Component - Wiring Harnesses.

MARKING:

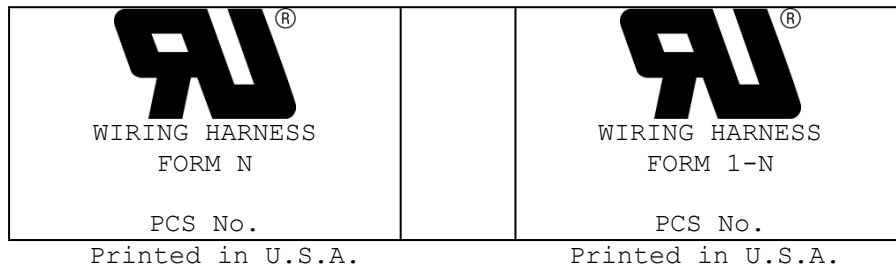
Recognized company's name or File number, factory identification (if applicable), and wiring harness diagram or diagram number or catalog designation on carton or container.

RECOGNITION MARKS:

Recognition Marks for wiring harnesses incorporate one of the following:

U.S. MARKING REQUIREMENTS

1. For products meeting U.S. requirements, one of the following labels shall be used, as applicable:




## CANADIAN MARKING REQUIREMENTS

Canadian Only

2. Where products meet only Canadian requirements, as indicated in the individual descriptive sections of this Procedure, the following Canadian Recognized Component Mark IS REQUIRED TO APPEAR ON THE TYPE L LABEL:




Note that the traditional U.S. Recognized Component Mark  is prohibited from appearing in conjunction with the Canadian Recognized Component Mark on the Type L label for products that have been evaluated to Canadian requirements only.

U.S. and Canadian

3. Where products meet U.S. and Canadian requirements, as indicated in the individual descriptive sections of this Procedure, the following Canadian Recognized Component Mark IS REQUIRED TO APPEAR ON THE TYPE L LABEL:



Note that the traditional U.S. Recognized Component Mark  may appear in conjunction with the Canadian Recognized Component Mark on the Type L label for products that have been evaluated to U.S. and Canadian requirements.

See the "Follow-Up and Inspection Instructions" for further details regarding the Recognized Markings.

## RECOGNITION MARKS:

There are two types of Recognition Marks employed in the wiring harness program: Form 1-N and Form N. The Recognition Marks are available in various denominations to cover the number of harnesses packaged in the shipping container. The form designation is determined as follows:

FORM 1-N: This Recognition Mark is used for harnesses consisting of four parts or less. Each piece of wire, fitting, splice, terminal block, wiring device, etc. is considered to be a part. Simple terminations of the eyelet, ring, open spade or quick-connect types are not counted as a part when determining the form label to be used. One of the four (or less) parts may be a Listed power supply cord.

FORM N: This Recognition Mark is used for harnesses having more than four parts as described above. The harness may include as one of the parts a Listed power supply cord.

File E524704  
Project 4790137970

October 08, 2021

REPORT

on

COMPONENT - Wiring Harnesses

NICAB LTD  
Silverstone, GB

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## DESCRIPTION

## PRODUCT COVERED:

USR, CNR Component - Wiring Harnesses.

## TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

CNR indicates investigations to the following Canadian requirements for wiring harnesses: CSA INFORMS Wiring Harnesses No. 2 dated 29 October 2010.

Notice to End-Use Engineer - The wiring harness components covered by this Report have not been investigated for use in any equipment. The material is essentially a general description of the assembly, which has been prepared to enable identification of parts in a harness, which is manufactured at one location and shipped to another. All components must be examined, fully described or otherwise identified, and possibly tested in the final application. The conditions of acceptability are of a general nature only and items critical to acceptance in the final application may have been omitted. Accordingly, it is necessary to fully evaluate these wiring harnesses under the requirements of the end-use category.

## Considerations in Evaluation of End Products -

1. Wiring harnesses, which comply with the wiring harness diagram or description, may be Recognized, but the acceptability of the Recognized harness in equipment Listed by UL LLC and the suitability of the harness diagram or equivalent description is dependent on the requirements applicable to the equipment itself.
2. The conditions of acceptability for individual components are included in the description of the component.
3. The wiring harness diagram is not required to be covered in the end use FUS Procedure or limit/restrict the types of components used in a wiring harness as long as the information/component descriptions contained on the wiring harness diagram prepared by the end use manufacturer are consistent with the information/component descriptions provided in the end product FUS Procedure.
4. If the end use product engineer chooses to include a wiring harness diagram in the end use FUS Procedure, the end-product engineer should ascertain that the wiring harness specifies the items of construction considered essential for compliance of the harness with the requirements of the end product. For example, if 600 V wiring is needed in the end product, this should be specified on the wiring diagram or in the description.

5. Where terminations or splices are insulated by means of Recognized insulating tubing applied by chemical dilation, heat shrinking, or heat sealing, the suitability of the insulation thickness is to be determined in the end-use product. The acceptability of the damage caused to the conductor insulation by the heat-bonding process is to be determined in the final application.
6. The wiring harnesses covered in this file are intended solely as factory-installed components of other equipment where the acceptability is to be determined by UL LLC. These wiring harnesses are not intended for field installation.
7. The Wiring Harness Manufacturer should only conduct tests covered in the Wiring Harness Manufacturer's FUS Procedure and not tests that are required at the end use manufacturer (per the end use manufacturer's FUS Procedure).
8. The wiring harness program does not cover assemblies for which an established UL Product Category already exists, i.e., an unlisted transformer with leads, integral or otherwise, can not be a wiring harness if the end use FUS Procedure requires the use of a Listed, Classified, or Recognized transformer.
9. Assemblies employing molded on fittings shall be covered under the Standard for Cord Sets and Power Supply Cords, UL 817, and CSA C22.2 No. 21.