Subject 1310 (In reply, refer to Subject 1310)

12 Laboratory Drive
Research Triangle Park, NC 27709
February 1, 2005

TO: **Standards Technical Panel (STP) for Power Supplies (STP 1310);**
Subscribers to UL's Standards Service for Class 2 Power Units, UL 1310;
Public Review Participants

SUBJECT: **Comments and Substantive Changes received on the ANSI Ballot and Review of the Proposed Fifth Edition of the Standard for Class 2 Power Units, UL 1310;**

SUMMARY OF TOPICS

This bulletin proposes the following changes in requirements:

This bulletin includes all comments received on the UL 1310 bulletin dated July 16, 2004 and the responses and dispositions to the comments. This bulletin also includes proposed revisions to the July 16, 2004 proposal bulletin.

COMMENTS DUE: March 1, 2005

The attached comment matrix provides the proposed comment dispositions from the ballot of the proposal bulletin dated July 16, 2004. The ballots were due to the Project Manager by August 20, 2004. The matrix contains all of the comments that were received. The effective date table in the July 16, 2004 bulletin is proposed to be revised and is included in its entirety in Appendix D.

UL has determined that consensus has been achieved regarding the ANSI approval of the proposed revisions to UL 1310. The initial consensus count is 5 Yes, 2 No, and 0 Abstain. If you wish to change your vote in light of the dispositions/actions or the proposed changes, please respond to us in writing by March 1, 2005. If we do not hear from you by this date, your original vote will be maintained.

If the STP concurs with the dispositions/actions, UL plans to adopt the revised version of UL 1310 as an ANSI standard.

Anyone who has submitted an objection has the right to appeal this action on a procedural basis through UL's Appeals Process. If you wish to appeal, please respond by March 1, 2005. Please note only appeals based on a procedural issue will be heard, technical issues should be resolved at the consensus body level. Guidelines on how to register an appeal can be obtained on http://ulstandardsinfonet.ul.com or by contacting the STP Project Manager.

UL appreciates the time and effort you have put forth to review this standard, and looks forward to your continued participation in this UL/ANSI standard activity.

UNDERWRITERS LABORATORIES INC.

JONETTE HERMAN
Project Manager for STP 1310
Staff Engineer
Standards Department
Research Triangle Park Office
Phone: (919) 549-1479
Fax: (919) 547-6179
E-mail: Jonette.A.Herman@us.ul.com

http://ulstandardsinfonet.ul.com

REVIEWED BY:

BRADLEY SCHMIDT
Chair for STP 1310
Global Standards Department
Northbrook Office
Phone: (847) 664-3064
E-mail: Bradley.J.Schmidt@us.ul.com

SR:SB

bul-1310.5_20050112

Attachments:

Appendix A – Comment Resolution Matrix - General Information and Definitions

Appendix B – Comment Resolution Matrix

Appendix C – Proposed Changes to the July 16, 2004 Bulletin

Appendix D – Impact Statements and Proposed Effective Dates

APPENDIX A

COMMENT RESOLUTION MATRIX - General Information and Definitions

The Comment Resolution Matrix provides the comment dispositions from the review and ballot of proposals for the fifth edition of the Standard for Class 2 Power Units, UL 1310.

Project Manager: Jonette Herman
Underwriters Laboratories, Inc.
Phone: (919) 549-1479
e-mail: Jonette.A.Herman@us.ul.com

STP Chair: Brad Schmidt
Underwriters Laboratories, Inc.
Phone: (847) 664-3064
E-mail: Bradley.J.Schmidt@us.ul.com

Description of Proposal: UL 1310 proposal bulletin dated July 16, 2004.

The columns in the comment resolution matrix can be defined as follows:

Commentor:	Name of person who submitted comment.
Paragraph / Text Reference:	Indicates the paragraph # or the specific reference for the comment
Comment:	The comment, suggested wording of changes, and rationale for change.
Action/Disposition:	The action, such as accepted or not accepted, and the justification for the action, if needed. The disposition such as resolved or unresolved. This column can be defined as follows: **ACCEPTED** = Accepted & will be incorporated into document **NOT ACCEPTED** = Rejected with reasons provided to the commentor. **ACCEPT IN PART** = Accepted a part of the commentor's suggestion **ACCEPT IN PRINCIPLE** = Accepted the general idea of the suggestion, possibly with revisions to commentor's suggestion **D** = Requires further discussion and possibly a meeting **HOLD** = Hold for processing proposal in next revision cycle **WITHDRAWN** = Proposal withdrawn by the proposal submitter

APPENDIX B

COMMENT MATRIX

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Bill LaFollette *Friwo* 8/28/04 (NO Vote)	Topic 1 – Backfeed Protection	The Back feed protection exception three (3), requires a test with the specific battery intended for use with the Battery Charger. In many instances, especially in the case of units sold through distribution, the battery size may not be known to the manufacturer. The proposed changes do not address this condition. One possible solution would be to allow a fuse, or equivalent current limiting device, in the output of the Battery Charger (inside the enclosure at the output cord connection). This combination of improved output cordage, per Table 10.2 of 1012 and 12.1 of 1310, and fusing at the input end of the cord would then address both back feed faults which would otherwise have potentially hazardous effects on the cord itself and the Battery Charger insulation/ isolation system.	**ACCEPT IN PRINCIPLE** Although the initial proposal intended to address these conditions, the proposal was not clear. A revised proposal to clarify the backfeed requirements is attached.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Thomas Siwek Bosch Tools 8/19/04 (public review comment)	Topic 1 – Backfeed Protection	I would like to address proposal item 1 covering the subject of backfeed protection. In the notation included in the rationale for the proposed requirements, there is a reference to a voluntary recall announced by the Consumer Product Safety Commission involving "2 million battery chargers associated with a battery operated drill." Based on the attributes referenced in the notation, I believe that the recall referenced is the recall announced by our company, Robert Bosch Tool Corporation, on February 14, 2003. The notation further states that UL obtained samples to duplicate field incidents and found the chargers to be in compliance with the standard, although, they did not utilize an optional backfeed protection. The notation further summarizes UL's evaluation and conclusions as to the causation of the overheating condition. I would first like to state that Bosch supports the proposal to make backfeed protection mandatory for energy above Class 2 limits and believes it will result in better performing and safer battery chargers. However, I feel compelled to inform you Bosch's investigation and analysis of the battery chargers involved in the recall resulted in different findings regarding the causation of the overheating condition. It is important to make UL aware of our findings because I feel that your proposal does not completely address the factors that can cause the overheating condition that this proposal is attempting to address. Bosch has found battery packs placed on continuous charge when the tools are not in use results in the plastic separator inside each cell being thermally stressed. These findings relate to aggressive charging profiles (C/5-C/3) with chargers that do not have a cut-off or shutdown when full charge is reached. The stress results in a degraded cell life that is normally 5 to 7 years to less than 2 years. Each cell ultimately short-circuits independently from the prolonged thermal stress. With the short-circuit of each cell, the transformer voltage declines and the current output increases. This continues in a cascading fashion until the entire battery pack is in a complete short-circuit condition. Under a complete short-circuit condition, the primary winding or thermal fuse opens before the integrity of the charger housing is compromised due to rapid heating of the transformer's primary coil. However, when approximately one half of the cells are shorted, there is enough energy to degrade the plastic housing before the primary windings and/or fuse can open.	**NOT ACCEPTED** UL appreciates the support to incorporate mandatory backfeed protection in UL 1310. However, the suggestion that UL 1310 needs to anticipate abnormal operation for other than short circuit conditions is unclear since UL 1310 already has requirements for these conditions (refer to the Output Loading Test).

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
(Cont.)	(Cont.)	The charger reaches a temperature that can exceed the RTI of the plastic housing resulting in deformity but not exceed the temperature to cause the transformer winding to fail. Up to this point, the UL requirements addressed the abnormal condition of a shorted battery pack. Our analysis and data suggests that the battery packs degrade over time and will experience a partial short condition before total failure. The key to our findings is that it is not component failure in the battery charger that starts the chain of events (as suggested in the UL proposal), it is the battery cell degradation that occurs naturally from prolonged charging and simple aging of the battery pack. In light of our findings and in the interest of public safety, Bosch proposes that in addition to the backfeed protection measures proposed, that a test be added to both standards that evaluates partial short circuits of the battery pack in addition to a complete short of the battery charger output. Further, the typical softwood, tissue paper and cheesecloth method of evaluating abnormal conditions would not be a suitable metric. Many of the chargers involved in field incidents did not experience failures that would have resulted in ignition of the combustibles. Many consumers expressed concern over the mere presence of a deformed charger housing and believed that this observation alone constituted a safety risk and a potential fire hazard in spite of the charger meeting all applicable abnormal operation requirements in the applicable UL standard. We have instituted an internal procedure that requires the repeated performance of the battery charger output short circuit test with partially shorted battery packs at 40 - 60 % of the number of cells and 65 – 80 % of the number of cells. (Example: a 24V NiCad battery pack contains 20 cells. The 24V battery pack will be tested with ten (10) and fifteen (15) cells shorted). While this is not in a standards proposal form, we greatly encourage UL and the STP for 1012 and 1310 to use this information as a starting point to draft additional requirements to address partially shorted battery pack conditions. Our hope is that UL and the members of the STP for 1012 and 1310 give serious consideration to our feedback and strive to further enhance the design of inherent protection in battery chargers.	

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Mark Gignac *EDS* 8/14/04 (NO Vote)	Topic 1 – Backfeed Protection	I am writing to strongly object to the "Revisions to back feed protection". Please note that Engineering Design and Sales feels that UL is inappropriately attempting to solve the problem described in the field incidents notes using back feed protection in the battery charger. We feel that if UL wants to truly address this issue, the battery should be the focus since it is the source of the power. Many, many battery packs are connected to the charger by cables or cordsets with some sort of connector at the end with the cordset visible while being charged. The external cord connected to the battery, before the end connector, is liable to be shorted by some form of mishap or misuse just as the cordset on the charger. In this case nothing is gained by the revised standard. In other applications, the battery charger is connected to the enclosure of the appliance and no external wire is visible. In these applications, there may be less opportunity for casual failure. However, the product itself may have marginal or even poorly constructed features inside the enclosure. Neither UL nor the charger manufacturer typically has the opportunity to see the internal construction and determine whether it is safe. UL's test described on Page 2 of 102, A1, was conducted by shorting one diode where serious results occurred. However, what if the test had been conducted by: 1. shorting one of the components in the tool, if any are located there 2. shorting the wiring in the tool or the charger cordset? It seems odd that only one possible fault was tested instead of the many possible fault conditions that could occur. If we are to believe that the diode failure in the charger is a real problem, is UL really certain that adding one more diode in the connector is anymore reliable than the one in the charger itself? In fact, diodes are utilized in almost every electronic device. After billions and billions have been manufactured, reliability is a minor issue. If the product in question had been thoroughly investigated, I wonder if UL would have found some other item at fault. If seems to me that one recall, while serious, is a bit of a stretch for standard change. In addition, I would like to see some industry experts review the failed products to verify UL's findings. E.D.S., in particular, would like to have the chance to review some field failures.	**NOT ACCEPTED** The scope of UL 1310 does not extend beyond the battery charger. Additional support from battery manufacturers and manufacturers of products that use batteries is needed in order to develop requirements, either in a new Standard, or in the existing Standards that cover batteries and products with batteries.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
(Cont.)	(Cont.)	Finally, E.D.S. recommends that UL investigate the appliance/tool circuitry, battery charge terminals, and possibly the discharge terminals to truly address and solve this problem. While some would argue that the battery is a low voltage device not subject to UL Standards, how can the battery be ignored if UL is truly addressing this issue? E.D.S. stands ready to participate in additional discussion and feel it is critical that this issue gets much more consideration before a change to the standard occurs.	
Joan Lawrence *Toy Industry Association (TIA)* 8/19/04 (YES Vote with comments)	Topic 1 – Backfeed Protection 38.8.2	1) Wording of 38.8.2 seems confusing. We assume what is meant is to connect a variable resistor to the output connector of the charger, which is also connected to the battery intended to be charged. "The input side of the connector is to be resistively loaded[mldr]" is confusing. We consider the input side to be the primary side of the transformer (120 V). The testing described all takes place in the output or secondary side of the transformer. Possible suggested wording to clarify: "The output connector is to be connected to a fully charged battery of the size, type, and number specified by the manufacturer. The charger output connector is to be resistively loaded, up to and including short circuit, to draw the maximum current. The current is to be measured after five seconds. The test is to be continued until results in accordance with 38.1 are achieved." 2) A sketch of the circuit showing the charger, battery, and the location of the protective device, meter, and variable resistor would be a great help to users of the standard to understand the test of 38.8.2.	**1) ACCEPT IN PRINCIPLE** A revised proposal to clarify the backfeed requirements is attached. **2) NOT ACCEPTED** The revised proposals for backfeed protection clearly convey the intent and method for test. If you still feel that sketch should be included, you will need to create the drawing and submit it as a new proposal request.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Dave Love *Jerome Industries* 7/14/04 (Public review comment)	Topic 1 – Backfeed Protection	The fifth edition requirement for mandatory backfeed protection should be modified based upon the latest field analysis of battery operated drills, where a diode in close proximity to the transformer apparently failed shorted. Earlier thoughts on backfeed protection centered around short circuits in the cord, caused by severe mechanical force trauma to the cord. As I recall, the case in point which elicited the UL response was a childs riding car toy with a large battery, and the charger cord was crushed between a folded plastic lawn chair, which later ignited. This particular situation has only occurred once to my knowledge. Modifications inside of the power adapter could be effective in eliminating risks caused by the battery operated drill incidents recently analyzed. A redundant diode or a fuse in the charger could economically eliminate the risk associated with transformer overheating. Furthermore, by taking Exception 3 in clause 13.4.3, utterly no protection is obtained for the type of problem encountered with the battery operated drills. <u>Summation:</u> An alternate backfeed protection scheme which allows for protection internal to the charger enclosure, should be looked at for cost/risk assessment.	**ACCEPT IN PRINCIPLE** Although the initial proposal intended to allow protection internal to the charger to protect against backfeed when a robust output cord is used, the proposal was not clear. A revised proposal to clarify the backfeed requirements is attached.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Mike McIntyre *Ault* 8/20/04 (Public review comment)	Topic 1 – Backfeed Protection	Thank you for the opportunity to provide comment on the proposed changes to UL 1310 fifth edition. We at Ault reviewed the proposed changes regarding Backfeed Protection and do not totally agree with them. Our concerns are as follows: In 13.4.3 it is specified that a battery charger shall be provided with a means to inhibit backfeed current in the event of a fault condition. The means of prevention are listed in 13.4.3 (a),(b) and (c). All the means of prevention listed under 13.4.3, are located in the connector of the output cable, and provide a means for the charger to fail safely in case of a single fault , for e.g failure of a blocking diode or a semiconductor device in the secondary of a transformer. The concern here is that many of the chargers and most of the chargers designed by Ault, are inherently double protected by virtue of charger construction or circuitry. These chargers have two or more semiconductor devices in the secondary not just one. Therefore they do not allow backfeed current into the charger in case of a single component fault in the secondary. So, in the case of these chargers it will be a redundant requirement to have a backfeed current inhibiting device in the output connector. For battery chargers with this type of design, the only failure mode remaining is if the output cord shorts due to poor quality or abuse. This could result in the insulation of the cord failing and causing a risk of fire. This can be resolved by using a good quality output cord equivalent to the input cord in size, gauge, type, insulation and other related parameters. In this case Exception No.3 of 13.4.3 will be applicable. However, Exception No. 3 states that if this construction i.e an output cord equivalent to an input cord is utilized than the test in 38.8.2 and 38.6 shall be performed. However, the way the test of 38.8.2 is stated, the output cord and connector will always fail if this test is performed. Since, for this particular construction, the backfeed protection circuitry is not located in the connector but in the charger. Hence when a fully charged battery is connected to the output connector, and it is loaded as stated in the test of 38.8.2, the current draw from the battery will only be limited by the load applied at the other end of the connector, and in case of some batteries can be hundreds of amperes.	**ACCEPT IN PRINCIPLE** Although the initial proposal intended to address these conditions, the proposal was not clear. A revised proposal for 13.4.3 to clarify the backfeed requirements is attached.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
(Cont.)	(Cont.)	Since the connector by virtue of Exception No.3 does not have a current limiting or inhibiting device, it will ultimately melt if it is hooked up to a battery capable of very high discharge currents. So even though the charger is backfeed protected at the charger level, it will fail the backfeed protection test since the test is performed on the cord and not on the charger. The UL 1310 standard does not state anywhere, an exception to 13.4.3 when the battery charger is inherently backfeed protected by virtue of its circuitry. In this case the charger can comply by using a proper cord provided the test of 38.8.2 is modified to be conducted at the charger secondary output after the semiconductor devices (backfeed protection) with one component shorted and not conducted at the input side of the connector. Myself and a member of Ault's engineering staff, had a discussion with Mr. Masri regarding this issue. We were in agreement on this issue.	
Francis Saliga *International Components Corporation* 8/19/04 (Public review comment)	Topic 1 – Backfeed Protection	We propose that an exception be made, if testing can show that no hazards exist backfeed protection is not required. This impacts chargers that charge batteries in parallel. We currently market parallel charging battery chargers and have received no field complaints regarding this issue. Proposed Exception No. 4: Means of protection is not required if component fault testing can show no hazards exist, in accordance with 38.1.	**ACCEPT IN PRINCIPLE** Although the initial proposal intended to address these conditions, the proposal was not clear. A revised proposal to clarify the backfeed requirements is attached.
Francis Saliga *International Components Corporation* 8/19/04 (Public review comment)	Topic 1 – Backfeed Protection 13.1.1	Paragraph 13.1.1 should be re-worded as follows: A Class 2 Power Unit with or without backfeed protection shall be provided with an output cord, terminals, insulated leads, output connector or a connector attached to or integral with the enclosure. See 13.4.3.	**ACCEPT IN PRINCIPLE** See the attached proposals.
Francis Saliga *International Components Corporation* 8/19/04 (Public review comment)	Topic 2 – Coil Insulation	While connecting the core to the primary causes no hazards this is not allowed in the CSA Standard C22.2 No 223-M91. What effort is being made with CSA to harmonize standards? Under this situation a cUL mark cannot be granted.	UL has confirmed with CSA that this construction is also accepted by CSA under C22.2 No. 223. Harmonization is being considered as a future project. We would like to complete the current revision cycle and then assess the level of industry support for harmonization.

COMMENT MATRIX Continued on Next Page

COMMENT MATRIX Continued

Commentor	Paragraph / Text Reference	Comment or Comment Summary	Action/Disposition
Francis Saliga *International Components Corporation* 8/19/04 (Public review comment)	Topic 4 – Use of Wood Blocks in Resistance to Crushing Test 44.5.1	I see no advantage of using hardwood. The use of a softwood such as PINE should be allowed. The 75 lb force is a figure of merit. All of our units will comply with 150 lbs. 150 lb would be a better figure, from the viewpoint of someone stepping on a unit.	**NOT ACCEPTED** The reason for revising the maple wood block specification is due to there being varying grades of hardness for maple. Rather than specify the maple hardness, it was proposed that specifying hardwood generically would allow greater flexibility in obtaining a suitable wood without making a substantial change in the requirement. Although pine may be an acceptable alternative, further analysis may be needed to determine the acceptability of pine for the test. Also, the 75 lb force is applicable only to direct plug-in units, and simulates forces likely to be applied when mounted on a wall outlet, such as furniture being pushed up against the power unit. Further rationale for modifying the 75 lb requirement would be needed.
Francis Saliga *International Components Corporation* 8/19/04 (Public review comment)	Topic 8 – Editorial Revisions 44.2.1	Regarding Par 44.2.1, we disagree with the proposed addition "The blades shall not be subjected to a direct impact". Subjecting the AC Blades to an impact is a reasonable test. We do it all the time, they bend, you straighten them out and continue the test. If the AC Blades loosen to an extent that they could remain in the socket you have a serious hazard. We find it advantageous to run mold stress on units prior to abuse tests. This can reveal other problems that you would not have not otherwise seen.	**NOT ACCEPTED** Blade integrity is determined by the Direct Plug-In Blade Secureness Test, Section 41, and Direct Plug-In Security of Input Contacts Test, Section 42. The impact test of 42.1 is intended to test the enclosure integrity rather than the blade secureness. The addition of a blade impact test would require a review of products and further testing. UL does not support further testing, as the current tests described above address integrity issues associated with the blades.

APPENDIX C

PROPOSED REVISIONS TO THE JULY 16, 2004 PROPOSAL BULLETIN FOR UL 1310 AS REFERENCED IN THE COMMENT MATRIX

For your convenience in review, proposed additions to the previously proposed requirements are shown underlined and proposed deletions are shown lined-out. Proposed new requirements are identified by (NEW) and shown underlined. A paragraph that is proposed to be deleted is identified by (DELETED) and is shown lined-out.

REVISIONS TO THE JULY 16, 2004 PROPOSALS

13.1.1 A unit ~~other than a battery charger with backfeed protection~~ shall be provided with an output cord, terminals, insulated leads, or output connectors. A battery charger with backfeed protection shall be provided with an output cord terminating in a connector, or a connector attached to or integral with the enclosure. See 13.4.3.

13.4.3 A battery charger shall be provided with a means to inhibit backfeed of current during a fault in the output circuit, including faults in the output wiring, which results in a risk of fire or electric shock. The means of prevention shall protect each output and shall consist of any of the following:

a) A fuse, calibrated in accordance with the Standard for Low-Voltage Fuses-Part 1: General Requirements, UL 248-1, and the Standard for Low-Voltage Fuses-Part 14: Supplemental Fuses, UL 248-14, located in the output connector and rated to correspond with the maximum overcurrent protection rating in Table 28.2 for the open circuit voltage involved;

b) A diode or fixed impedance located in the output connector where it will limit backfeed current ~~to no more than 8 amperes from a dc source with a no load voltage rating equal to the output voltage rating of the battery charger and a short-circuit capacity of 200 amperes~~ in accordance with the test specified in 38.8.1 and 38.8.2; ~~or~~

c) An overcurrent protector equivalent to (a) located in the output connector~~.~~; or

d) An output cord equivalent to that specified in Table 12.1 with respect to insulating material and thickness; and the battery charger complies with the test specified in 38.8.3 and 38.8.4.

Exception No. 1: A means of protection is not required when a specific battery or battery pack, to be used with the charger, does not exceed Class 2 parameters at any level of charge condition. See 49A.9.

Exception No. 2: A battery charger employing integral batteries is not required to comply with 13.4.3.

Exception No. 3: ~~A battery charger provided with an output cord equivalent to the input cord with respect to size, gauge, type, insulation, and related parameters or that is in compliance with Table 12.1 is not required to comply with 13.4.3. The tests specified in 38.6 and 38.8.2 are to be performed when this construction is utilized. The testing per 38.6 shall be performed on any component in the output circuit the failure of which would allow backfeed in excess of Class 2 levels.~~

(DELETE)

13.4.4 ~~Compliance with the requirements of 13.4.3 shall be determined by conducting the backfeed protection test specified in 38.8.~~

38.8 Backfeed protection

38.8.1 The output connector of a battery charger provided with backfeed protection in accordance with 13.4.3 (b) or (c) shall be subjected to the test described in 38.8.2. As a result of the test, ~~a current greater than 8.0 amperes shall not be measured after five seconds on the input side of the output connector~~ the backfeed current shall not exceed 8.0 amperes at five seconds, and there shall be no emission of flame or molten material from the enclosure or output cord .

38.8.2 ~~The~~ In accordance with 38.8.1, the output connector is to be connected to a ~~fully charged battery of the size, type, and number specified by the manufacturer~~ source as specified in (a) or (b). ~~The input side of the connector is to be resistively loaded, up to and including short circuit, to draw the maximum current.~~ A resistive load up to and including short circuit is to be connected as close as practicable across the output connector such that the maximum obtainable backfeed current is passed through the output connector. The current is to be measured ~~after~~ at five seconds. ~~The test is to be continued until results in accordance with 38.1 are achieved.~~ The test is to be continued until ultimate results are obtained. The source shall be either:

a) A fully charged battery of the size, type, and number specified by the manufacturer; or

b) A dc source with a no load voltage rating equal to the output voltage rating of the battery charger and a nominal short-circuit capacity of 200 amperes.

(NEW)

38.8.3 A battery charger provided with backfeed protection in accordance with 13.4.3(d) shall be subjected to simulated component faults, one at a time, of open or short circuit which may result in backfeed of current into the secondary circuit (refer to 38.8.4). During the test the output connector shall be connected to a source as specified in 38.8.2 (a) or (b), and the test is to be continued until ultimate results are obtained. One minute after the test the unit shall be subjected to the dielectric voltage withstand test of 32.1.1 (a), (b) and (c). As a result of the test, there shall be no emission of flame or molten material from the enclosure or output cord, and no indication of dielectric breakdown.

(NEW)

38.8.4 In accordance with 38.8.3, faults shall be simulated for components such as diodes, transistors, capacitors, and the like unless the components have permanence and reliability (see 10.1). If an overcurrent protector, such as a fuse or PTC, operates to limit the backfeed current, the protector shall comply with requirements applicable to the component.

49.9 A battery charger with backfeed protection in accordance with 13.4.3 ~~and 13.4.4~~ shall be marked "Backfeed Protection", "BFP", or the equivalent.

APPENDIX D

IMPACT STATEMENTS AND PROPOSED EFFECTIVE DATES

Paragraphs, Tables, Figures, or Section Number	Impact	Proposed Effective Date
13.1.1, 13.4.3, 13.4.4, 38.8 and 49.9.	These proposals regarding backfeed protection for battery charges, if adopted, will require a review and possible testing to maintain the certfication.	Effective 24 months after publication.
5.11, 12.1.4, 38.5.1, 49.1.8, and 50.4	These proposals regarding direct plug-in units for use by travelers (for example, use on both nominal 120 and 240 volt supply) if adopted, will require a review and possible testing to maintain the certification.	Effective 24 months after publication.
50.5	In the fourth edition of UL 1310, paragraph 50.5 had a previous effective date of October 20, 2006. The effective date will be carried over to the fifth edition since the date is still future effective.	October 20, 2006 (future effective date previously adopted)
All remaining paragraphs, Tables, and Figures	No review or re-test of currently Listed or Recognized products will be needed.	Effective upon the date of publication.

No Text on This Page