

Electrical connections

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Reconditioned electrical equipment, a 2020 NEC® Guide

Authorities having jurisdiction (AHJ's) are responsible for determining whether an installation, including equipment that may be new or reconditioned, is safe and meets the applicable codes and standards. For many years the National Electrical Code® (NEC®) was relatively silent on the use of rebuilt and reconditioned equipment. The 2017 edition of the NEC added a new informational note to Section 110.3(A)(1) stating "Equipment may be new, reconditioned, refurbished, or remanufactured" while a new subsection was added to Section 110.21(A) that addressed equipment marking for reconditioned equipment. NEC Section 110.21(A)(2) requires reconditioned equipment to be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment could be identified along with the date of the reconditioning. In addition to the marking requirements, Section 110.21(A)(2) makes it clear that approval of the reconditioned equipment shall not be based solely on the

equipment's original listing. With the addition of these sections to the 2017 NEC questions arose regarding what type of electrical equipment was suitable for rebuilding, reconditioning and remanufacturing as well as a clear understanding of what constitutes "reconditioned."

During the 2020 NEC development process multiple revisions to the NEC were approved to address the aforementioned issues. One of the key revisions was a definition of "reconditioned" which is now defined in Article 100 as "Electromechanical systems, equipment, apparatus, or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-10)." This definition clearly differentiates between routine maintenance and servicing of electrical equipment in accordance with any manufacturer's instructions and electrical equipment that has undergone rebuilding or reconditioning to restore it to operating conditions.

Another significant revision was to Section 110.21(A)(2). This section was revised to require removal of the original listing mark on reconditioned electrical equipment. The Certification (Listing) Mark from UL is the manufacturer's declaration that the product was manufactured in





accordance with the applicable certification requirements and was in compliance with those requirements when it was shipped from a factory. When equipment is modified, rebuilt or reconditioned after it leaves a factory, UL does not know if a product continues to meet the applicable certification requirements unless the modification or reconditioning has been specifically evaluated by UL. Removing the original Certification (Listing) Mark ensures that approval of the reconditioned electrical equipment is not based on the equipment's original Certification (Listing), which inherently cannot address the specific reconditioning that later occurs to the equipment. It is also important to understand that this revision does not require that the entire equipment label be removed. The equipment label contains important information such as voltage ratings, short circuit current ratings and other information critical for proper installation of electrical equipment. A new Informational Note No 3. was added to Section 110.21(A) (2) to clarify the distinction between the listing mark and equipment label.

Not all electrical equipment is suitable to be reconditioned, rebuilt or remanufactured due to its design features or critical role in safety. **The 2020 NEC has specifically identified the following types of equipment are not permitted to be reconditioned:**

- Equipment that provides ground-fault circuit-interrupter protection for personnel (210.15)
- Equipment that provides arc-fault circuit-interrupter protection (210.15)
- Equipment that provides branch-circuit ground-fault protection of equipment (210.15)
- Low-voltage fuseholders and low-voltage nonrenewable fuses (240.62)

- Molded-case circuit breakers (240.88(A)(1))
- Low-voltage power circuit breaker electronic trip units (240.88(B))
- Medium-voltage fuseholders and medium-voltage nonrenewable fuses (240.102)
- Receptacles (406.3(A))
- Attachments plugs, cord connectors, and flanged surface devices (406.7)
- Panelboards (408.8(A))
- Luminaires, lampholders and retrofit kits (410.7)
- Listed low-voltage lighting systems or a lighting system assembled from listed parts (411.4)
- Fire pump controllers (695.10)
- Transfer switches (695.10, 700.5(C), 701.5(C), 702.5(A), 708.24(A))

Additionally the 2020 NEC has identified specific types of electrical equipment that can be reconditioned including:

- Low-and medium-voltage power circuit breakers (240.88(A)(2))
- High-voltage circuit breakers (240.88(A)(3))
- Electromechanical protective relays and current transformers (240.88(B)(2))
- Switchboards and switchgear, or sections of switchboards and switchgear (408.8(B), 490.49)

Reconditioned equipment permitted by Sections 240.88, 408.8(B) and 490.49 must be listed as reconditioned. Switchboards and switchgear or sections of switchboards and switchgear are additionally permitted to be field labeled as reconditioned.

Note that the National Electrical Manufacturers Association, (NEMA), has published the NEMA Policy on Reconditioned Electrical Equipment

(https://www.nema.org/Policy/Documents/NEMA-Position_Refurbishing_on_ElecEquip.pdf)

This document contains important information on industry positions relative to the suitability and safety of reconditioned equipment in the electrical infrastructure, and processes for accomplishing the reconditioning of suitable equipment.

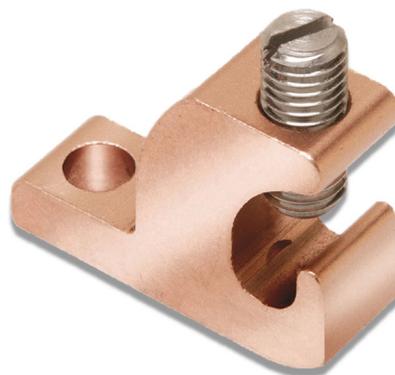
UL has a longstanding rebuilt equipment certification program for specific types of products that are fully evaluated to the same safety requirements used to evaluate newly constructed products. The general guide information for each product category with a rebuilt certification program identifies the applicable requirements and the specific marking for products rebuilt under the program. Only rebuilt products that bear the UL Mark together with the word “Rebuilt,” “Refurbished,” “Remanufactured,” “Reconditioned” or “Renovated” have been investigated by UL to the applicable certification requirements and comply with UL’s factory surveillance requirements for the qualified rebuilder.

To find more information regarding UL’s reconditioned electrical equipment program or to search for Certified (Listed) reconditioned electrical equipment please visit UL’s UL Product iQ™ located at <https://productiq.ul.com>. The UL Product iQ database is the next generation of UL’s online certifications database. Access to Product iQ is free, but registration is required. Additionally UL may be able to provide field evaluations for electrical equipment that has been reconditioned in the field. For more information on UL’s field evaluation services contact UL’s customer service at **877-854-3577,#2** or www.UL.com/field.

Summary

The 2020 NEC has taken multiple steps to address the safe use of reconditioned electrical equipment. These steps include creating a definition of “reconditioned” and requiring the removal of the original listing mark when equipment undergoes reconditioning to clarify the technical aspects of the approval. Additionally there were multiple revisions to identify specific electrical equipment that can and cannot be reconditioned. UL has established a reconditioned (rebuilt) certification program for a multitude of products when it can be demonstrated that the equipment can be reconditioned by qualified parties and continue to meet the requirements of the applicable safety standard. Additionally UL can provide field evaluation services for permitted types of electrical equipment that has been reconditioned in the field.

Determining the suitability of direct burial rated grounding terminals



Q: A UL file number next to a direct burial rated grounding terminal in an electrical supply catalog directs me to UL product category Wire Connectors

and Soldering Lugs (ZMVV) in the UL online certifications directory. ZMVV is for wire connectors that are NOT suitable for direct burial. Is it possible that the product is certified to more than one UL product category and has multiple uses? How can I determine if the product I am about to purchase is suitable for grounding, bonding and direct burial?

A: There are many manufacturers who submit a product to UL for evaluation and request the product to be Certified (Listed) in multiple product categories. Sometimes, this results in UL issuing multiple file numbers for a single product. This can be confusing if a supplier’s product catalog or sell sheet does not include each separate UL file number covering a product.

UL product category Wire Connectors and Soldering Lugs (ZMVV) covers single-polarity wire connectors for use with copper, aluminum or copper-clad aluminum conductors or all three for the purpose of providing contact between current-carrying parts. The Standards used to investigate products in this category are ANSI/UL



486A-486B, the Standard for Safety of Wire Connectors, and ANSI/UL 486C, the Standard for Safety of Splicing Wire Connectors. These connectors may be

uninsulated, or supplied with integral insulation or separable insulation. However, these connectors have not been evaluated for environmental ratings. Wire connectors intended for direct burial, below-grade use, or similar damp or wet locations are covered under UL product category Sealed Wire-Connector Systems (ZMWQ).

UL product category Grounding and Bonding Equipment (KDER) covers the following:

- bonding devices
- ground clamps
- grounding and bonding bushings and locknuts
- ground rods
- armored grounding wire
- protector grounding wire
- grounding wedges
- ground clips for securing the ground wire to an outlet box
- water-meter shunts
- and similar equipment

The Standard used to investigate products in this category is ANSI/UL 467, the Standard for Safety of Grounding and Bonding Equipment. These connectors may or may not be insulated. Because they are connected to grounding or bonding conductors and are only intended to establish an effective ground-fault current path, these connectors may be suitable for direct burial applications without the additional sealed system of a wire connector evaluated as a sealed wire-connector system. There is a note in the KDER guide information indicating that grounding and bonding equipment suitable for burial in earth or that can be embedded in concrete is marked for such uses. The marking may be abbreviated “DB” (for direct burial). Because these connectors may be suitably rated as a wire connector when properly applied within a piece of equipment, but are also suitable for

direct burial when used in a grounding and bonding application, it is important to know when each rating applies. To address this issue, there is a note under the heading of “Direct Burial” in the ZMVV guide information that directs the reader to related products and UL product categories Sealed Wire-Connector Systems (ZMWQ) and Grounding and Bonding Equipment (KDER).

There are many wire terminals that have been Certified (Listed) in both ZMVV and KDER. It is easy to verify the UL Certification of the connector by using UL’s online certifications directory, UL Product iQ at <http://productiq.ul.com>. UL Product iQ replaced UL’s legacy Online Certifications Directory earlier this year and will also replace the UL Product Spec database when it is retired November 15, 2019. UL Product iQ contains the same trusted UL certification information in a modern, user-friendly database and is free to all users but requires registration, so register today at <http://productiq.ul.com>. On UL Product iQ you can search by the file number, manufacturers name, product category code (ZMVV and KDER) or title, keyword or even model number. Once the correct manufacturer’s Certification (Listing) is found, a user can click on it to review specific product model numbers aligning with a supplier’s catalog or sell sheet.

It is easy to verify the UL Certification of the connector by using UL’s online certifications directory

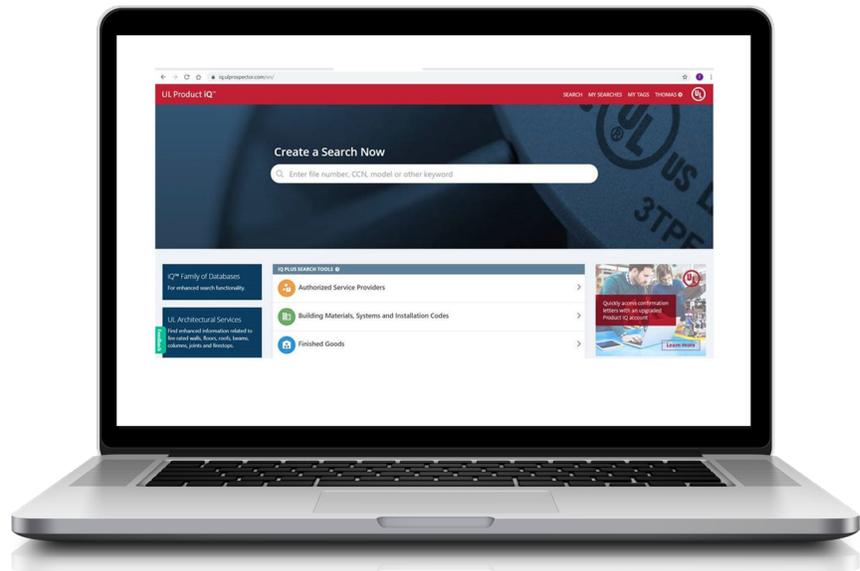
Introducing UL Product iQ

Q. I tried accessing UL's Online Certifications Directory and was redirected to UL Product iQ, which requires registration. Has UL's Online Certifications Directory been replaced by Product iQ? Is access to the replacement database still free?

A. Yes. Product iQ is the next generation of UL's Online Certifications Directory and access to it is free. Product iQ – located at <http://www.ul.com/database> – contains the same trusted UL certification information in a modern, user-friendly database. Creating a free account and logging in is only required on your initial visit. You will remain logged in unless you log out, disable or clear your cookies. Registering for Product iQ allows UL to learn how Certifications are accessed in order to better understand customer needs and interests.

Product iQ Overview

Product iQ offers the best of UL's Online Certifications Directory and UL Product Spec®, in a single database for the U.S., Canada and the rest of the world. The intuitive guided keyword search allows you to search by almost any criteria in one field. Search by UL file number, product type, CCN (category code), fire resistive design or assembly number or even a model number. Just enter your term in the keyword search and then select from



the guided suggestions to expedite your search. You can also refine your results further to target exactly what you need.

You can identify UL Certified (Listed) products that meet a specific section of a model installation code by selecting building materials, systems and installation codes from the UL iQ™ Plus Search Tools on the main search page and accessing the Installation Code Search. In addition, there are parametric searches for Electrical Circuit Integrity Systems, FHIT as well as hourly rated fire resistive designs, assemblies and through penetration firestops systems.

Product iQ also offers premium features which give you the ability to save searches, tag content and

searches, receive notifications and produce UL confirmation letters for evidence of compliance. If you are a code authority, access to an upgraded account is free. When registering as a code authority, additional verification may be necessary.

Product iQ can be saved to the home screen on your mobile device to provide immediate access to all UL Certification (Listing) information in the field where you need it. Go to productiq.ul.com and register today! Product iQ has recently been enhanced to include the search capability of UL Product Spec, which will retire on Nov 15, 2019. For uninterrupted access to the information in UL Product Spec, please register for a free Product iQ account.

