

FAQ

Connectors now qualified for use in UL508-certified control cabinets



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What is UL 508 certification?

UL 508 (508A and 508C) is a certification standard for electrical control cabinets and switchgear. It provides assurance to machine builders and their customers (as well as regulators and insurers) that the cabinet can be operated safely and reliably. Globally, it is not the only standard covering control cabinet safety, but is the one most often used in North America.

Why were connectors not certified to UL and other standards already?

Substantially all industrial connectors used in North America are UL-certified for general use from the time they are introduced. The same connectors also are used widely on other continents in electrical control cabinets certified to other major certification standards. However, until recently, their assigned UL status did not pre-qualify them for use in UL 508-certified cabinets.

What was in the way of having connectors used in UL 508 cabinets and switchgear before?

There wasn't an absolute prohibition, just no certain pathway for their inclusion. Industrial equipment complying with UL 508 had to contain components and sub-assemblies whose product groups are listed in UL 508 Appendix A, "Standards for Components". Connectors had been relegated by UL (Underwriters Laboratories) to historical electrical interface categories such as ECBT2, which uses UL 1977 as their base standard. With this category rating it was the responsibility of the machine builder to demonstrate to UL's satisfaction that ECBT2-class connectors could be used safely in a UL 508 application. The OEM's UL field representative would conduct a thorough investigation of the application, including the overall electrical transmission path, for possible safety issues. The uncertain cost and duration of this supplemental approval process was usually enough to cause a machine builder to take the path of least resistance and hardwire all electrical connections, foregoing the cost and time savings offered by plug & play connectorization. Now, that procedural deterrent has been removed, clearing the way for using connector-based wiring as an alternative to hardwiring.

How has the way been cleared for connectors?

At the behest of HARTING, UL created a new section of UL 2237, a complementary standard to UL 508 that governs multi-point connections of power cables. This new section is under the category PVVA2 which allows for approved "recognized" connectors to be used and still be compliant with the UL508 standard. By having this second option, customers now have the ability to purchase recognized components

UL 508

from HARTING and build their own assemblies, or to purchase the more traditional "UL-Listed" cable assemblies from HARTING. When HARTING took on the task of having our connectors tested by UL, it transferred the testing burden from the machine builder to the connector manufacturer. It effectively pre-clears them for UL 508 application without additional time and money for UL testing and certifications. This is possible because PVVA and PVVA2 components can be used in UL 508-certified cabinets without a lengthy additional safety investigation, provided they are being used in the prescribed manner.



Connectors now approved by UL for use on 508A cabinets.

Connectors on the PVVA2 list are UL Recognized? What does this mean?

Once they pass supplemental testing, these well-established connectors earn the “UL Recognized” mark allowing them to be employed in user-created, field-assembled control cabinets. By using UL Recognized connectors, OEM’s can fast track UL 508 certification since the traceability and documentation of these connectors has already been established. These “Recognized” connectors are the same ones that HARTING uses to manufacturer “UL Listed” cable assemblies under the PVVA category. The assemblies bearing a UL Listed certification mark can be used virtually without restriction where UL 508 certification is being sought. With two offerings, “Recognized” components and “Listed” assemblies, it gives users the flexibility to assemble the connectors however they decide is best for them. If a custom solution better suits the application, the OEM can create it using UL Recognized (PVVA2) connectors and still be compliant, provided that they follow the applicable UL standards of building such assemblies.

UL Recognized connectors must be used in the prescribed manner. What does that entail?

The connectors and components must be installed by trained technical professionals following the “Conditions of Acceptability” (CoA). For example, the power distribution cables should be selected in accordance with the TC-ER declaration and the approved wire AWG cable cross-section choices. Also, protective devices (fuse types RK5, CC, J or T) must be used on the cable path. Additionally, the short circuit current rating (SCCR) for the connectors must be compared against the requirements of the cabinet. UL Recognized connectors are by default, given the lowest SCCR rating (5kA) by UL unless additional testing is done. The SCCR rating of each cabinet may vary depending on the components used, and can potentially require additional current protection devices if components do not match to the overall level that the cabinet requires. HARTING opted to test, and passed, to the highest SCCR value (65kA) rather than a lower level such as 5kA and as such, does not limit our customers in their use of its components.



UL listed cable assembly

Now that they have the option, why would machine builders choose connector-based wiring over hardwiring?

In most cases, connectors offer a better business case. Hardwiring only really competes economically with connectors when a cabinet is to be wired only once. As soon as it has to be unwired and rewired a second time, which often happens at some point prior to customer acceptance, the cost advantage shifts decisively to connector-based wiring. A machine large or complex enough to have an external cabinet or cabinets often is assembled at the plant and tested, then disassembled and shipped to the customer’s location and re-assembled. With hardwiring, each connection has to be individually unmade for shipping, then remade in the field at a significant additional labor cost. During field setup, it’s common for hardwiring errors to occur, delaying startup, even causing damage in extreme cases. Connectors are plug and play; the same wiring can be unplugged and plugged in again in seconds. With a connector-based wiring assembly, if it worked correctly at the plant, it will work in the field from the get-go. Each OEM has its own labor costs, but end user benchmarking suggests that each subsequent detaching and re-attaching of multiple hardwired connections during the operational life of a machine can add hundreds, even thousands of dollars, in extra labor and ancillary costs. This is a cost saving for the OEM and potentially for the end user when maintenance or upgrading is performed. That’s why connectors are increasingly the go-to wiring approach in modular machine design.



UL listed cable assembly and recognized connectors on a panel