

## Norms – USA, Canada

### New safety standard for industrial power supplies in the USA and Canada **UL 61010 replaces UL 508 for industrial power supplies**



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The efforts in the United States to adapt international standards instead of insisting on national norms, has been a very positive move. In regards to power supplies, ANSI/UL 61010-1 and ANSI/UL 61010-2-201 have replaced the old UL 508 standard for industrial control equipment.

This makes fulfilling the global regulatory requirements considerably easier for power supply manufacturers and their users.



#### Progress in the development of new norms and standards

Work on standardisation and the development of new norms and standards has not been able to keep pace with the rapid development in automation technology over the last 30 years. The result has been a disorderly conglomeration of norms and standards that were not harmonised internationally and that covered a mixture of different requirements. For example, electrical safety aspects and functional requirements were often not clearly separated. Therefore, it is not surprising that in the field of electrical safety, standards from other fields such as the IEC 60950-1 (Information Technology Equipment), have been used.

The IEC (International Electrotechnical Commission) recognised this less than satisfactory situation and in 2011 started to form cross-standard working groups. For example, the JWG13 (Joint Working Group) was formed that is dedicated to the requirements of INDAT (Industrial Automation Technology). The tasks of this working group are to evaluate existing standards, identify missing topics and create a standard, which can be internationally harmonised.

An innovative step was the separation of electrical safety aspects that are naturally less subject to rapid changes, and functional requirements that need to be adapted and updated much more frequently due to rapid technological advances.

To assess electrical safety, the IEC 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1 General requirements) was used as the basis and was supplemented by part -2-201 (Particular requirements for control equipment). As power supplies belong to the group of industrial control equipment, these standards also apply to them.

In 2016 the development of these standards reached the point that power supplies can be tested and approved accordingly. The number of accredited test laboratories has also increased exponentially since then. Product standards such as the IEC 61131-2 (Programmable Controllers) have removed their safety requirements and are instead pointing to IEC 61010-2-201.

### Harmonisation and international acceptance

The IEC 61010-1 and IEC 61010-2-201 are internationally harmonised and accepted in the most important economic regions around the globe. The IECEE CB-Scheme procedure allows national certification bodies to utilize the CB-Scheme test reports and use them for the national certification process.

In the USA, ANSI/UL 61010-1 and ANSI/UL 61010-2-201 replace the now rather unpopular and outdated UL 508 (standard for industrial control equipment) for industrial power supplies. Assuming the national deviations of the ANSI/UL 61010-1 are taken into account in an approval process according to IEC 61010-1 and IEC 61010-2-201, it is possible to ap-

ply for a UL mark using the CB-Scheme test reports. The ANSI/UL 61010-2-201 was even adopted without any national deviations from the IEC version.

As American and Canadian standards in the field of industrial applications have always been harmonised, it is not surprising that CAN/CSA-C22.2 No. 61010-1 and the CAN/CSA-C22.2 No. 61010-2-201 replace the old CAN/CSA-C22.2 No. 107 and No. 142 in Canada as well.

In Europe, the EN 61010-1 and EN 61010-

2-201 are listed in the Official Journal of the European Union and can be used for presumption of conformity of the safety objectives of the Directive 214/35/EU (Low Voltage Directive). This means that an EU Declaration of Conformity can be issued based on these standards.

### Overview of Norms

#### **UL 508**

Industrial Control Equipment

#### **UL 508A**

Industrial Control Panels

#### **IEC/EN 60065**

Audio, video and similar electronic apparatus – Safety requirements

#### **IEC/EN 60950-1**

Information technology equipment – Safety – Part 1: General requirements  
Also known as ITE norm (Information Technology Equipment)

#### **IEC/EN 61010-1, ANSI/UL 61010-1**

Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

#### **IEC/EN 61010-2-201, ANSI/UL 61010-2-201**

Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-201: particular requirements for control equipment

#### **IEC/EN 61131-2**

Industrial-process measurement and control – Programmable controllers  
Part 2: Equipment requirements and tests

#### **IEC/EN 62368-1**

Audio/video, information and communication technology equipment  
Part 1: Safety requirements  
Also known as ICT norm (Information Communication Technology)

#### **2014/35/EU**

Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits  
Also known as Low Voltage Directive (LVD)

## ANSI/UL 61010-2-201 replaces UL 508 for industrial power supplies

ANSI/UL 61010-2-201 has been in effect for industrial power supplies since February 2016 as the official replacement standard for UL 508. Approvals according to the old UL 508 remain valid, but are no longer listed as a possible option for conformity assessment in some UL categories. It is anticipated that sooner than later, a change to this new standard will be required. For example, the UL category NMTR (Industrial Control Equipment - Power Circuits and Motor-mounted Apparatus) references power supplies to ANSI/UL 61010-1 and ANSI/UL 61010-2-201 and no longer to UL 508.

Although most power supplies are classified as „Open Equipment“ in the context of ANSI/UL 61010-2-201, they are permitted to have a UL-Listing-Mark. Compared to the UL-Recognition-Mark, the UL-Listing-Mark has the advantage that no additional tests are required when changing to a different power supply model in an application.

If the Canadian standards are also taken into account during the UL approval process, a cULus-Listing-Mark can be affixed that is accepted based on a joint recognition agreement with Canada.

## Required changes to power supplies in accordance with UL 61010 in comparison to UL 508

The differences between UL 508 and ANSI/UL 61010 are significant. This is because UL 508 still uses a very old and outdated safety approach.

Additional requirements for ANSI/UL 61010-2-201 as compared to UL 508:

- Double or reinforced insulation. All accessible parts must be separated from any hazardous part by two level of protection. UL 508 requires only a single level of protection.
- Protection against mechanical hazards,

such as sharp edges or moving parts.

- Additional production line testing such as high-voltage testing, protective earth conductor testing.
- Single fault testing on a number of specified components to verify that there is still a level of protection for the user in case of individual faults.
- Specific material properties and flammability requirements for the enclosure.
- Stricter evaluation of transformers with isolating insulation.
- Extended number of temperature tests including at the lower end of the specified temperature range.
- Performing a risk assessment.
- Additional tests to assess durability and readability of device markings. Devices need to be tested when exposed to cleaning agents or isopropyl alcohol.

These are just some of the differences from UL 508. However, for power supplies designed and manufactured in line with the latest edition of the IEC 60950-1, these changes should not represent a problem. They can generally be adapted without hardware modifications. Primarily installation manuals and product markings need to be adapted and supplemented with the warning notices currently valid and required.

## Field experiences with UL 61010-2-201 approved power supplies

In the United States, each electrical installation and its cabinet must be inspected by an inspection body, the AHJ (Authority Having Jurisdiction), in accordance with the NFPA 70 rules prior bringing the installation into service. The NFPA (National Fire Protection Association) is the regulatory authority in the USA. Devices conforming to ANSI/UL 61010-1 and ANSI/UL 61010-201 are therefore just as suitable as those conforming to UL 508.

Power supplies conforming to UL 61010-2-201 are classified in the same UL cate-

gory (NMTR) as those of the old UL 508. This means, that there should be no compliance issues in the approval process of the end applications.

In control cabinets according to UL 508A, power supplies evaluated according to ANSI/UL 61010-2-201 are permitted to be 100% loaded and do not require a 50% derating, as required for power supplies conforming to UL 60950-1. Unfortunately, chapter 42.2.3 of the 2018 edition of UL 508A contains an error that also requires this derating for UL 61010 power supplies. This error was corrected via a CRD (Certification Rationalization Decision), which came in force immediately after it was issued.

During a UL 61010 approval process, NEC Class 2 (see info box) tests can also be taken into account and no additional approval according to UL 1310 (Class 2 Power Units) is required. This is possible as Article 725.121 of the NEC Codebook of 2017 (National Electrical Code) lists the UL 61010-1 and UL 61010-2-201 as option for evaluating a power source according to NEC Class 2.

## No more need for UL 60950-1 pre-approvals as it was required for UL 508

The process to achieve a UL 508 approval was much easier after a successful UL 60950-1 component approval. A UL developed transition test program enabled to upgrade the UL 60950-1 approved component to a UL 508 listed unit.

The ANSI/UL 61010-2-201 approval process leads directly to the desired UL-Listing-Mark. This eliminates what is known as Dual Marking, where a device has both the UL-Listing-Mark for UL 508 and the UL-Recognition-Mark for the component approval according to UL 60950-1.

Customers who prefer a 60950-1 approval approach for global market access reasons can use the IEC 60950-1 CB-Scheme, which is available for many devices.

## Summary

Adopting international standards instead of insisting on national standards is a very positive move in the United States and Canada. It simplifies the process of a global product launch. Properly applied, this strategy avoids duplicated efforts, leading to higher quality, lower costs and a much faster market launch.

### NEC Class 2

The American NEC (National Electrical Code) defines the requirements for electrical circuits with a lower hazard potential. These circuits are called NEC Class 2 circuits and are not permitted to exceed certain voltage, current and power limits. They are rewarded by simpler installation requirements. For example, wiring without cable ducts when separated machinery or systems parts need to be interconnected. For equipment supplied by these circuits, it is assumed that the risk of fire is reduced. During an approval process of such equipment, a reduced test effort and lower fire protection measures are sufficient. Even some tests are completely eliminated. These NEC Class 2 circuits must be supplied from a NEC Class 2 listed power sources. For 24V circuits, this means 100W maximum, which corresponds to about 4.2A. In the event of a fault (overload, short circuit or component failure), the current must not exceed 8A and the power has to stay below 100W.

If the power requirement of the system or machine permits it, it is advantageous if the power source (= power supply) complies with these requirements.