



**Electrical Systems**  
Control & Automation Solutions



**Machinery Manufacturers** - Meeting  
the legal and technical requirements of  
the North American market.



Staying the right side of the UL standard in the US and North America. **Tony Hague**, Managing Director of PP Electrical Systems, explains why compliance confusion can be costly for machinery manufacturers.



# Standard errors



As a manufacturer of machinery, how confident are you that you are meeting the legal and technical requirements of the US and North American markets? Confusion in respect to UL508A and NFPA standards can be extremely costly.

As a specialist in electrical control systems and automation – with 15 years’ experience of designing and building systems to meet (Underwriters Laboratory) UL 508A standards – at PP Electrical Systems we are amazed at the level of confusion that still shrouds what does and does not constitute a UL certified product.

UL 508A certification is an industrial control panel standard, which is sought by electrical inspectors.

The UL 508A Listing Mark on an industrial control panel provides evidence of third party certification to the municipal inspection authority and to the purchaser of the panel. In essence, it shows that the panel complies with an acceptable safety standard.

This applies to any company that is supplying control panels or building machinery for export to the United States and North America. This could be firms involved in food processing or packaging equipment, machine tool manufacturers, pharmaceutical, scientific

or semiconductor plant. It can carry a far reaching remit.

## Vendor beware

Many companies believe that by simply selecting components that are UL listed and integrating them into a control panel that also carried a UL (NEMA) rating, that was the start and end of the exercise.

In fact, a number of machinery manufacturers have adopted this approach and depending on which US states they have been exporting to, may have managed to escape any serious issues.

But that is until they come across a more stringent inspection, whether state specific or just a more detailed and thorough site inspector. Then the problems can be huge.

There will be re-working, supplying new components and even the time and financial cost of dispatching engineers overseas to sort out the problem as quickly as they can.

.....  
***“UL 508A applies to any company that is supplying control panels as part of automated machinery for export to the United States and North America”***  
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And this isn't even taking into consideration consequential penalties from the customer due to late installation of machinery and the impact this can have on future business relationships.

All of these issues can be easily avoided by taking a more proactive approach and working with companies that can offer a complete UL solution in line with specific needs.

Prior to manufacturing a UL approved electrical panel, we will first undertake crucial checks of customer's submitted designs. Some examples of checks and considerations and the common issues of non-compliance are described below.

It is very important that the design is checked for compliance with the UL 508A standard prior to manufacturing the panel, in order to ensure UL compliance and thus enable us to apply a UL mark to the electrical panel.

### Defining the required SCCR (short circuit current rating)

Electrical panels must be designed to achieve a rated minimum short circuit current rating. A 5000 Amp prospective symmetrical fault current rating will be sufficient in many cases. Some applications require a much higher SCCR and these higher fault current withstand ratings can be achieved with the right design. The SCCR is one of the most important electrical panel design factors as AHJs (US Authorities Having Jurisdiction) can prevent connection and use of an electrical panel if its SCCR rating is not greater than the symmetrical fault current rating of the power supply that it will be connected to.

### Voltage rating and end customer site electrical power network configuration

Electrical panels will normally either be connected to a single-phase 115V or three-phase 460/480Vac 60 Hz public power supply network in the USA. Sometimes system voltages of 575V or even 690Vac three phase may be seen. Power network connections may be star or delta configuration and the point of connection could, for example, be a 'grounded delta' supply. Further design considerations here will include adequacy of proposed transient voltage surge suppressor modules or components.

In the case of a grounded delta network configuration for example, prospective

transient impulse voltages of 6 kV can appear between incoming phases and the panel's earth connection (perhaps due to a nearby lightning storm or switching on and off of large electrical loads on the local power network). The electrical panel rated impulse voltage withstand requirement will be agreed and the design checked to ensure it complies. Note that standard UL compliant electrical panels will be rated up to 600Vac maximum (normally 115Vac, 230Vac or 480Vac). Connection to a 690Vac power network requires special assessment and design. AHJ's can prevent connection of electrical panels that do not have suitable impulse voltage withstand rating.

### Wire bending space

Electrical panels must be designed to provide the necessary minimum wire bending space in accordance with UL 508A requirements. The bending space is the distance between a field wiring termination point inside the panel and the directly opposite metal wall of the panel. The distance required depends on the 'ampacity' (current rating) of the field wiring cables. AHJ's will prevent connection of electrical panels that do not have sufficient wire bending space. Clearly, the cable size calculation is important and it can affect the dimensions of the panel in some cases.

### US NFPA 70 NEC and NFPA 79 code compliance

The UL 508A standard incorporates many requirements that are derived from the US NFPA (US National Fire Prevention Association) standard no. 70 - the 'NEC' (US National Electrical code). An example is cable 'ampacities' (current ratings). Whilst checking an electrical panel design to the many clauses of the UL 508A standard, this does not guarantee that a design will be in accordance with the relevant NEC articles and many of these are application-specific.

This is yet another example of where electrical panels can be prevented from connection to an electrical supply by the authorities, if they are found to be noncompliant with the US NFPA 70 NEC or NFPA 79 machine safety codes.

As you can start to see, there's a lot to take in when considering all of the implications associated with UL 508A and the potential significance of getting it wrong.

Some benefits of incorporating an electrical control panel carrying the UL 508A certification include:

- The UL 508A certification provides the inspection authority and your customer evidence that the control panel complies with nationally recognised safety standards, which ensure public safety and compliance with national and local electrical codes.
- Manufacturers that carry the UL 508A certification are subject to periodic unannounced inspections of their facilities by UL personnel. Through periodic audits, UL makes sure the manufacturer continues to meet the UL requirements for 508A certification.
- The UL mark on a component means that UL has evaluated and tested samples of this component and has concluded that they meet the necessary requirements, thus protecting the quality and integrity of the control panel.



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FURTHER READING:

A longer version of this article is available at [bit.ly/Standarderrors](https://bit.ly/Standarderrors)



## PP FACTS



### OUR PREMISES

- 40,000 sq ft world class production facility
- Over £1 million invested in automation
- Lean manufacturing environment



### STAFF

- Over 200 skilled employees supported by our own nationally accredited internal training facility



### OUR QUALITY

- Six Sigma Quality Processes
- SC21 Signatory, Aerospace & Defence
- Winner of 9 Manufacturing Awards, including best factory in the UK



- t +44 (0)1922 419 109
- f +44 (0)1922 418 181
- e sales@power-panels.co.uk
- w www.powerpanels.uk.com

Power Panels Electrical Systems Ltd,  
Landywood Green, Cheslyn Hay, Walsall,  
West Midlands WS6 7AL

## Benefits of specifying PP UL 508A listed industrial control panels

### ■ Guaranteed US & Canadian safety standards compliance

Our UL Listed panels are manufactured under regular stringent UL factory audits to meet key US national and local electric safety regulations.

### ■ Save time and money on field evaluation inspection

Avoids the costly 'field evaluation' inspection of every panel and the associated unpredictable outcome.

### ■ Global recognition and quick response

Respected globally, the UL listing mark may be specified in procurement documents for contracts outside of the USA, commonly in Middle East countries such as the UAE.

A 'global' design can be produced, allowing panels to be shipped to the EU, USA, Canada, and further afield without 'special' build variants being needed. This allows for quick response to new commercial opportunities.

### ■ Boost sales and stand out from your competitors

The UL Listing mark on your panel and/or machine can increase sales and set you apart from the competition.

### Included in the PP UL Listing service:

- Combined 'cULus' Canadian and US UL Listing mark.
- Complete panel and machine 'design for compliance service' including part selection and layout.
- UL compliant cable design and assembly for panels and machines.

WORKING WITH



*Enhanced global design acceptance - the prestigious UL Listed mark is sought after by end customers all over the world.*

### ON SITE SEMINARS

We deliver regular UL seminars either at PP or on location at customer sites.

To book an appointment and to understand the UL process and the benefits to your business.

### CONTACT US TODAY!

e [ulsolutions@power-panels.co.uk](mailto:ulsolutions@power-panels.co.uk)

### NFPA79 Standards & Compliance

*In addition to UL Standards, PP are able to offer advice and solutions in line with the critically important standards associated with NFPA79.*

*NFPA79 is the electrical standard for industrial machinery in the USA. The NFPA79 is a standard published by the National Fire Protection Agency, the same agency that publishes the National Electrical code NFPA70.*

*NFPA79 has special provisions addressing safe wiring practices for industrial machinery. Part of this standard refers to special cables and defines the standards required when constructing machines destined for the USA. It defines the correct scope for the use of UL listed and UL recognised cables.*



*The standard is enforced by "authorities having jurisdiction". These bodies can be company owners, Insurance companies or their agents and federal/state departments.*



Member of the MAN Group  
(Midlands Assembly Network)