



## NEC / NFPA 70 Edition 2017 - Article 670 New Surge Protection Requirements for Industrial Machinery

### Overview of the NEC and Surge Protectors

The latest release of NEC/NFPA 70 edition 2017 has placed a greater emphasis on increasing personnel safety by mandating the use of Surge Protective Devices (SPDs).

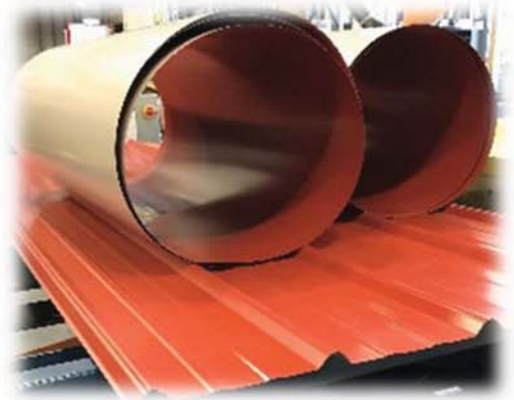
From 2014 to 2017, the number articles now requiring SPDs has increased significantly for applications ranging from Modular Data Centers, Fire Pumps, Elevators, Critical Operations Power Systems, Radio & Television Equipment.

### Threat to Industrial Machines

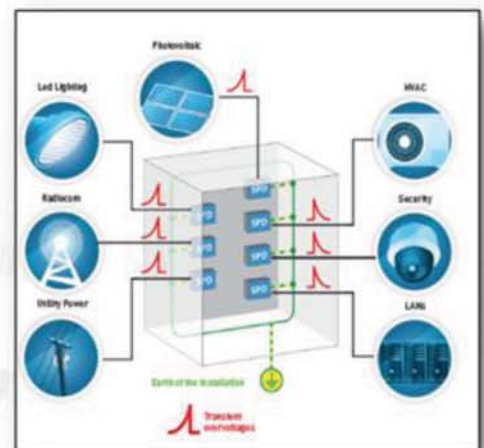
Various codes and standards possess safety interlock criteria including the American National Standards Institute (ANSI) standards and NFPA 79 for Industrial Machinery. However, until now, these standards have only just begun to address the expanding role that surge protection plays in preserving the integrity of equipment and, more importantly, protecting the lives of personnel.

A study commissioned by the Fire Protection Research Foundation, “**Data Assessment for Electrical Surge Protective Devices**”, provides results of a 2013-2014 survey of facility managers concerning surge damage. (NFPA 2014)

The study shows that **26 percent** of facility managers had damage to safety interlocking systems on industrial machines due to surges. The main purpose of these safety interlocking systems is to protect workers and maintenance personnel from contact with exposed live parts and electric shock. Failure of these devices can put personnel at an increased risk of injury.



### The “Box Concept”



**Protect All Copper Wires!**  
**Leave No Vulnerabilities!**





## The Solution for NFPA 70 and NFPA 79

To mandate the installation of a Surge Protective Device (SPD) at the industrial machines interlocking safety circuit. This measure will not only extend the life of the interlock safety circuit components but also increase the reliability of the system as a whole.

NFPA 70 Article 670. 6 :

***“670.6 Surge Protection. Industrial machinery with safety inter-lock circuits shall have surge protection installed.”***



In addition, the future NFPA 79 is considering the following changes:

*“7.8.1 Surge Protective Devices (SPDs). SPDs shall be provided for industrial machinery with safety interlock circuits to protect against the effects of overvoltages due to lightning or switching surges.”*

as well as

*“4.5.2 Electromagnetic Compatibility (EMC). Transient suppression, isolation, or other appropriate means shall be provided where the equipment of an industrial machine generates electrical noise or transients, which can affect the operation of equipment that is on or part of the industrial machine.”*







## Selecting the appropriate SPD

NEC/NFPA 70 require that Surge Protective Devices (SPDs) be UL Listed. This means selecting a surge protector is easier than it has ever been. There are only a few choices available for SPD's that are UL Listed for any of the most commonly used surge standards including UL1449 4<sup>th</sup> Edition, UL497B, and UL497E.



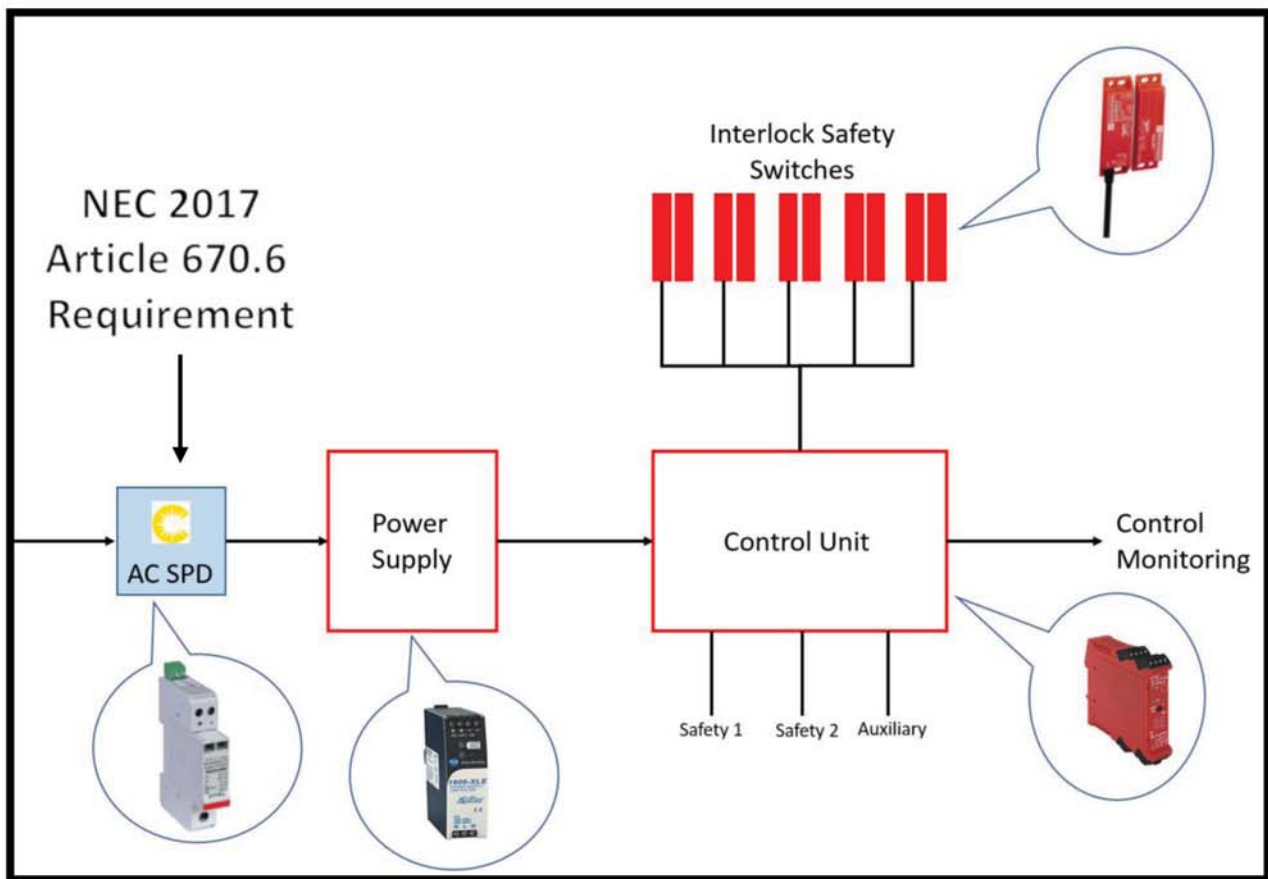


## Interlock Safety Circuit SPD per Application

Application	CITEL Solution Reference	CITEL Solution Pictures
480Vac Incoming AC Supply	DS74US-480D	
120Vac Power Supply	DS72US-120S	
24Vdc Power Supply	DS220S-24DC	
Twisted Pair wires – RS485	DLA-12D3	
Ethernet Signal	MJ8-CAT5E	
Wireless Communication	P8AX09-N/FF	



## Interlock Safety Circuit SPD Primary Location





## Type of machines covered by NFPA 79

Type	Description
<b>Machine Tools</b>	Metal cutting Metal forming
<b>Plastics Machinery</b>	Injection molding machines Extrusion machinery Blow molding machines Specialized processing machines Thermoset molding machines Size reduction equipment
<b>Wood Machinery</b>	Woodworking machinery Laminating machinery Sawmill machines
<b>Material-Handling Machines</b>	Industrial robots Transfer machines Sortation machines
<b>Inspection/Testing Machines</b>	Coordinate measuring machines In-process gauging machines
<b>Packaging Machines</b>	Carton-strapping machines Drum-filling machines Palletizing machines

### References,

- 1.) NFPA 70 edition 2017, Article 670 Industrial Machinery, 670.6 Surge Protection, [www.nfpa.org](http://www.nfpa.org), 2017
- 2.) NFPA 70 edition 2014, "Data Assessment for Electrical Surge Protective Devices", <http://www.nfpa.org/News-and-Research/Fire-statistics-and-reports/Research-reports/Electrical-safety/Data-Assessment-for-Electrical-Surge-Protection-Devices>, 2017
- 3.) NFPA 79 edition 2015, [www.nfpa.org](http://www.nfpa.org), 2017
- 4.) NFPA 79 edition 2015, Annex C, Examples of Industrial Machines Covered by NFPA 79, [www.nfpa.org](http://www.nfpa.org), 2017
- 5.) ANSI, American National Standards Institute, [www.ansi.org](http://www.ansi.org), 2017
- 6.) UL1449 4<sup>th</sup> Edition, Surge Protective Devices, [www.ul.com](http://www.ul.com), [http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=VZCA.GuideInfo&ccnshorttitle=Surge-protective+Devices&objid=1078524289&cfqid=1073741824&version=versionless&parent\\_id=1078524288&sequence=1](http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=VZCA.GuideInfo&ccnshorttitle=Surge-protective+Devices&objid=1078524289&cfqid=1073741824&version=versionless&parent_id=1078524288&sequence=1), 2017
- 7.) UL497B, Surge Protectors for Data Lines and Fire-Alarm Circuits, [www.ul.com](http://www.ul.com), [http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=QVGG\\_E184939&ccnshorttitle=Isolated+Loop+Circuit+Protectors&objid=1074034217&cfqid=1073741824&version=versionless&parent\\_id=1073992594&sequence=1](http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=QVGG_E184939&ccnshorttitle=Isolated+Loop+Circuit+Protectors&objid=1074034217&cfqid=1073741824&version=versionless&parent_id=1073992594&sequence=1), 2017
- 8.) UL497E, Antenna Lead-in Conductors, [www.ul.com](http://www.ul.com), [http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=QVLA\\_E349646&ccnshorttitle=Protectors+for+Antenna+Lead-in+Conductors&objid=1082185668&cfqid=1073741824&version=versionless&parent\\_id=1079208913&sequence=1](http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=QVLA_E349646&ccnshorttitle=Protectors+for+Antenna+Lead-in+Conductors&objid=1082185668&cfqid=1073741824&version=versionless&parent_id=1079208913&sequence=1), 2017

