

NFPA 79 and NEC Code requirements for surge protective devices

By **Matt Hemphill**

Product Marketing Manager – Surge Protection

Jack Coghlan

Lead Product Marketing Specialist – Surge Protection

Phoenix Contact USA



The 2018 Edition of NFPA 79 (Electrical Standard for Industrial Machinery) specifies the use of surge protective devices (SPD) for machines with safety circuits in Article 7.8.1 Surge-Protective Devices (SPDs) for Protection of Equipment. This specification has been in effect since November 30, 2017, in those areas of the United States that have adopted NEC 2017. It applies to all industrial machines placed into the U.S. market.

SPDs limit the voltage transients induced on conductors to prevent safety equipment from being disrupted or disabled. Some examples of transient voltage sources include load switching, capacitor bank switching, short circuit events, and lightning events.

In accordance with the latest edition of the NEC (2020), SPDs are mandatory for:

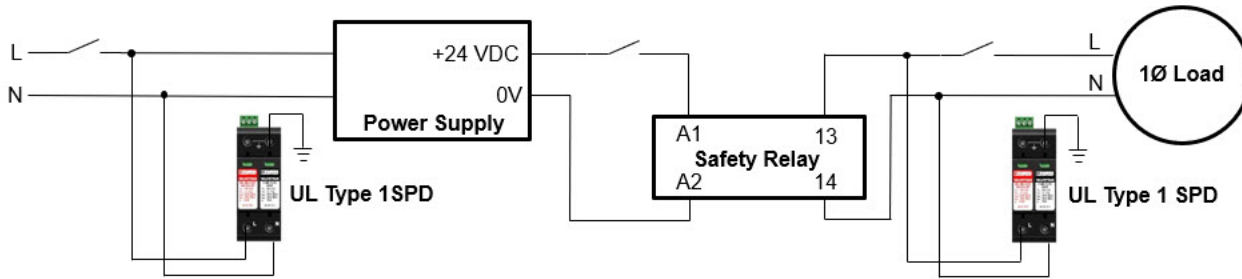
- **NEC Article 230.67 Surge Protection** for dwellings.
- **NEC Article 620.51(E) Surge Protection** for Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts and Stairway Chairlifts.
- **NEC Article 645.18 Surge Protection** for Critical Operations Data Systems.
- **NEC Article 670.6 Surge Protection** for Industrial Machinery.
- **NEC Article 695.15 Surge Protection** for Fire Pump Controllers.
- **NEC Article 700.8 Surge Protection** for Emergency Systems.
- **NEC Article 708.20(D) Surge Protection** Devices for Critical Operations Power Systems (COPS).

NEC addresses all electrical installations generically. The NFPA 79 deals specifically with industrial machinery. Following the revisions to the NEC in 2017, it was necessary to coordinate those changes within the NFPA 79. Hence, the 2018 edition of the NFPA 79 addressed those changes from Article 670.

Article 670 dictates that power supplies for industrial machines equipped with safety circuits must be protected with SPDs. These SPDs must be Listed to UL 1449, and they must feature a short-circuit current rating (SCCR) greater than the available fault current at the installation location within the electrical distribution system.

The following diagram illustrates a typical safety circuit layout protected with SPDs from the VAL-US Series.

(over)



Surge protective devices for the power supply must be installed as close to the power input point as possible. The VAL-US Series makes product selection particularly easy. As UL Listed Type 1 devices, they can be deployed anywhere within the electrical distribution. In addition, the intensity of transient activity within the electrical system may require higher-capacity SPDs.

The following table provides recommended surge protection, depending on the transient environment for the power conductors in safety circuit applications per the new 2018 NFPA 79 requirements.

Power surge protection recommendations to meet NFPA 79 (2018)		
Voltage configuration	Normal operating environments	Harsh operating environments
120 V 1Ø 2-Wire (Plus ground)	VAL-US-120/40/1+1-FM (2910349)	VAL-US-120/65/1+1-FM (2910356)
120 V Split Ø 3-Wire (Plus ground)	VAL-US-120/40/2+1-FM (2910352)	VAL-US-120/65/2+1-FM (2910358)
120/208 V 3Ø 4-Wire WYE (Plus ground)	VAL-US-120/40/3+1-FM (2910354)	VAL-US-120/65/3+1-FM (2910360)
220/380 V 3Ø 4-Wire WYE (Plus ground) 230/400 V 3Ø 4-Wire WYE (Plus ground) 240/415 V 3Ø 4-Wire WYE (Plus ground)	VAL-US-240/40/3+1-FM (2910367)	VAL-US-277/80/3+1V-FM (2910379)
240 V 3Ø 3-Wire DELTA (Plus ground)	VAL-US-240/40/3+0-FM (2910366)	VAL-US-480D/30/3+0-FM (2910386)
120/208 V 3Ø 4-Wire HL DELTA (Plus ground)	VAL-US-240HLD/40/3+1-FM (2910371)	VAL-US-480D/30/3+0-FM (2910386)
277/480 V 3Ø 4-Wire WYE (Plus ground)	VAL-US-277/40/3+1-FM (2910374)	VAL-US-277/80/3+1V-FM (2910379)
347/600 V 3Ø 4-Wire WYE (Plus ground)	VAL-US-600D/30/3+0-FM (2910391)	VAL-US-600D/30/3+0-FM (2910391)
480 V 3Ø 3-Wire DELTA (Plus ground)	VAL-US-480D/30/3+0-FM (2910386)	VAL-US-600D/30/3+0-FM (2910391)
600 V 3Ø 3-Wire DELTA (Plus ground)	VAL-US-600D/30/3+0-FM (2910391)	N/A

For additional information, go to: www.phoenixcontact.com/2018-NFPA79