Code Amendment Proposal Application

Department of Consumer & Business Services
Building Codes Division
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Read the entire code amendment proposal application before completing this form. Please complete all parts before submitting your proposal and refer to the provided checklist.

APPLICANT INFORMATION

Name: Eric Sherman		Date: September 25, 2022
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PROPOSAL INFORMATION

Specialty code: Oregon Electrical Specialty Code

Code section(s): 230.67

Briefly explain the subject of your proposal: Adopt model 2023 NEC article 230.67 - Surge Protection - for dwelling services

INSTRUCTIONS AND CHECKLIST

Fill in all the information above and submit this page, signed and dated, with the required supplementary information for Parts I, II, III, and IV described on page 2 of this application. This application may be submitted by mail to the mailing address above, or by email to BCD.PTSPtech@oregon.gov.

Summary checklist for the applicant:

- ■ **Part I** Code amendment language is attached in the proper format.
- ■ **Part II** Amendment proposal requirements for amending the code have been reviewed.
- ■ **Part III** Amendment proposal criteria questions have been answered and are attached.
- ■ **Part IV** If applicable, additional ORSC energy efficiency amendment proposal information is attached.

Note: One application is required for each code section you are proposing to amend. If this proposal requires changes in other sections of the code for alignment, include those changes as part of this application.

APPLICANT SIGNATURE

Signature: E. Sherman Date: Sep. 25, 2022

Part I – Code Amendment Language Proposal

Adopt 2023 NFPA 70 - National Electrical Code article 230.67 as indicated:

230.67 Surge Protection.

(A) Surge-Protective Device.

All services supplying the following occupancies shall be provided with a surge-protective device (SPD):

(1) Dwelling units
~~(2) Dormitory units~~
~~(3) Guest rooms and guest suites of hotels and motels~~
~~(4) Areas of nursing homes and limited-care facilities used exclusively as patient sleeping rooms~~

~~Informational Note: See 517.10(B)(2).~~

(B) Location.

The SPD shall be an integral part of the service equipment or shall be located immediately adjacent thereto.

Exception: The SPD shall not be required to be located at the service equipment as required in 230.67(B) if located at each next level distribution equipment downstream toward the load.

(C) Type.

The SPD shall be a Type 1 or Type 2 SPD.

(D) Replacement.

Where service equipment is replaced, all of the requirements of this section shall apply.

(E) Ratings.

SPDs shall have a nominal discharge current rating (In) of not less than 10kA.

Part II – Code Amendment Proposal Requirements

Code proposal depicted above in Part I satisfies proposal requirements. Intent is for addition/modification of technical aspects of Oregon Electrical Specialty Code and contains no proposals for Administrative aspects of Electrical Code Program

Part III – Code Amendment Proposal Criteria

1) **Describe the concept and purpose of this proposal.**
   This proposal is intended to adopt, in part, the language of model 2023 NEC article 230.67 to require surge-protective devices on new or replacement dwelling services. This reflects the 2020 NEC language that Oregon did not adopt, and strikes out the additional locations added in 2023 NEC 230.67(A).

2) **What problem in the existing Oregon code or national model code is this proposal solving? How does this amendment address the issue? If you have evidence demonstrating the problem, submit that information.**

First and foremost, I am not affiliated in any way with the electrical product manufacturing industry nor the insurance industry. I am a working electrician on the Oregon Coast, primarily engaged in small projects and service work, that has personally seen the effects and damage caused by line surges on dwelling unit appliances and equipment.

The lack of required overvoltage protection leaves a substantial gap in the Oregon Electrical Specialty Code's mandate to provide enforceable measures of consumer protection for electrical installations for Oregon residents. Proper selection and installation of over*current* protection has always driven a significant share of effort and expense on electrical installations, and in a way, forms the backbone of electrical infrastructure and premises wiring as a whole. Overvoltage protection, until recently, has not received the same consideration. Nonetheless, power surge events cause a significant amount of damage, financial hardship, and downright safety hazards throughout the state.

The 2020 NEC mandated overvoltage protection for dwelling services in 230.67. Furthermore, the new 2020 NEC article 242 established a one-stop location for overvoltage protection reference. With additional expansion of surge protection requirements in the 2023 NEC (which I am not proposing for adoption at this time), it is clear that the NFPA is taking steps to rectify this lack of mandatory protection, and Oregon should follow suit.

In the past, Oregon has been understandably hesitant to adopt new code language that would mandate new technology or impose additional construction & development expense. This has been the case for the implementation of AFCI devices as well as more recent model code expansions of GFCI requirements. However, surge protection technology is not new. It is an established technology, already in use the world over with point-of-use devices as well as whole-system devices integrated into service equipment large and small. Insurance companies recognize the value of SPDs. When included with new or replacement services on dwelling units, the cost of installation is low. Furthermore, most name brand whole-house surge protection includes a manufacturer warranty providing coverage for equipment protected by the device.

Most equipment in dwellings is substantially protected from overcurrent by a number of mandatory requirements; service OCPDs supplying feeder and/or branch circuit OCPDs supplying properly sized and installed circuit conductors and connections are well established installation practices. However, in terms of overvoltage protection, most electrical equipment has no protective elements between themselves and the entire connected power grid. Transient surges typically occur multiple times per day, slowly degrading unprotected components in household appliances and electronics, and power quality issues/outages can cause more substantial surges which can destroy those components outright. With extreme weather conditions driving both planned and unplanned grid outages, it is time for Oregon's Electrical Specialty Code to provide invaluable consumer protection at a minimal cost by adopting NEC 230.67.

Substantiation:

According to the Fire Protection Research Foundation's final report on Data Assessment for Electrical Surge Protective Devices, published October 2014, the NEC took several code cycles to adopt mandatory surge protection proposals primarily due to lack of compiled data. This lack of data drove the research effort that produced the report, and forms the bulk of research that substantiated the new 2020 and 2023 NEC language on the subject. Data on surge events and outcomes for this report was largely derived from insurance industry claim reports and records.

To summarize, this report indicates that, although surge protective devices for premises wiring systems are widely adopted and used, there was a lack of industry standards guiding their use and installation in dwellings. A trilogy of IEEE standards exists governing the suggested capabilities and uses of surge protection devices, in addition to prescriptive requirements detailed in NFPA 70 and 780.

The report also illustrates the types of devices most commonly affected by power surges, notably including safety equipment such as smoke detectors, fire alarm systems, and security systems among the most severely damaged. Shockingly, less than 15% of the surveyed respondents reported no damage to any life-saving equipment or devices.

Sources of surges can range from minor, such as nearby industrial or large commercial facilities switching inductive loads on and off, to moderate, such as utility switching of capacitor banks and other equipment, to major, such as lightning strikes. **All of these events occur multiple times per day for the typical utility-supplied electrical service.** The damaging effects of surge events can manifest suddenly with major surges, or gradually with slow degradation of equipment and components subjected to elevated voltages.

All name-brand integrated surge protective devices have been certified by national standards laboratories acceptable under OAR 918 and ORS 479.

3) **Has this been proposed at the national model code level? If so, explain when it was proposed, what happened, and why it was not adopted.**

As discussed in the above referenced report, surge protection code articles were proposed for the 2011 and each subsequent edition of the NEC. Language was adopted in the 2020 NEC and expanded in the 2023 NEC.

Implementation and Fiscal Impact

1) **Explain how the proposed provisions would be enforced. Are additional inspections or permits required? Describe any necessary equipment, training, tests, or special certifications.**

Enforcement of a newly adopted OESC 230.67 would be included with a typical service inspection already mandatory for new and replacement dwelling services. No additional inspections or permits would be required for enforcement purposes.

No special equipment is required for the installation of service surge-protection devices. No additional training or certifications would be necessary for licensed Oregon electrical contractors and electricians. The installation of non-mandatory surge protective devices has been ongoing for years and is not a new practice. Adherence to manufacturer instructions per OESC 110.3(B) and Oregon OSHA standards for electrical safety in the workplace would continue to play a role in surge device installation.

2) **What is the fiscal impact of this proposal? Provide a cost benefit analysis and include the resources or methods used to determine the fiscal impact.**

The Fire Protection Research Foundation's 2014 report on surge protection and events included a scientifically conducted survey of respondents who had suffered surge damage to their electrical

systems. Most respondents (61%) reported damages up to $10,000 with another 16% reporting damages exceeding $50,000. Nearly all (95%) of the respondents also purchased surge protection devices within three months of their reported incident. Insurance company data is generally unavailable to the general public, but reports and policy documents strongly imply that power surges cost insurance companies and consumers upwards of tens of billions of dollars ever year across the United States. Oregon residents most likely share this burden proportionally.

Residential-grade surge protection devices intended for installation directly in a typical residential loadcenter range from approximately $75 - $150 depending on make & model and vendor and are adequate for most uses. Higher-end devices with additional features and higher energy ratings range from approximately $200 on up. Installation of a surge protective device during construction or replacement of an electrical service would take a negligible amount of additional labor. The overall expense of replacing a dwelling service in its entirety typically runs several thousands of dollars, and the inclusion of an SPD at this time would be a figurative drop in the bucket, but with substantial long-term savings due to the resulting protection of expensive home appliances and electronics. Additionally, many insurance companies may offer premium discounts for installation of whole-house surge protectors. Finally, over its lifespan, any surge protector can be expected to pay for itself simply in terms of protecting more expensive equipment from damaging power events.

Total cost estimate for including proposed surge protection installation requirement on construction of a new 1,200 ft^2 dwelling on a 6,000 ft^2 parcel with a typical 200 amp, 240/120-volt split-phase utility service and service equipment: $150 - $200 including equipment, retail mark-up, and labor.

Impacted stakeholders and other specialty codes

1) **It is important that proposals be shared with stakeholders that will be impacted by them. Was this proposal developed with people or organizations likely to be affected by it? Has it been reviewed or shared with people or organizations likely to be affected by it? If so, who, and if not, why not?**

   No. I can't imagine the equipment manufacturers or insurance companies having a problem with it. Stakeholders would include every contractor and consumer involved in residential electrical construction throughout Oregon. Contractors would get an opportunity to sell additional components, and consumers would benefit from a relatively inexpensive but fundamentally important electrical safety device that will most likely save them significant financial burden. I believe it is a no-brainer to include dwelling overvoltage protection in the Oregon Electrical Specialty Code.

2) **Does this proposal impact other specialty codes or statewide programs?**

   No.

Part IV – ORSC Energy Efficiency Additional Code Amendment Proposal Criteria

Not applicable.

References:

Davis, E., Kooiman, N., Viswanathan, K., Hughes Associates, Inc. (2014). Data Assessment for Electrical Surge Protection Devices. Produced by The Fire Protection Research Foundation. Retrieved September 2022 from *https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Electrical/RFDataAssessmentforElectricalSurgeProtectionDevices.ashx*

Vigstol, Derek. (2019). A preview of important issues related to the 2020 NEC. Published by and at www.npfa.org. Retrieved September 2022 from *https://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2019/July-August-2019/In-Compliance/NFPA-70*

James, S., Kularatna, N., Steyn-Ross, A., Künnemeyer, R. (2014). Estimation of transient surge energy transferred with associated time delays for individual components of surge protector circuits. Institute of Engineering and Technology Journal IET Power Electronics. Retrieved September 2022 from *https://ietresearch.onlinelibrary.wiley.com/doi/epdf/10.1049/iet-pel.2014.0212*

Mishra, S., Shah, M. (2022). Surge Protection Devices Market Size, Share & Trends Analysis Report By Product (Hard-wired, Plug-in, Line Cord, Power Control Devices), By Type, By Power Rating, By End-use, By Region, And Segment Forecasts, 2022 – 2030. Produced and published by Grand View Research. Retrieved September 2022 from *https://www.grandviewresearch.com/industry-analysis/surge-protection-devices-market* and by written email correspondence with the publisher.