

NFPA 70®-2020, 2023 and 2026 Editions

National Electrical Code®

TIA Log No.: 1924

Reference: 210.8(F) Exception No. 2

Comment Closing Date: September 9, 2026

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www.nfpa.org/70

Proposed wording for the 2020 Edition:

1. Revise 210.8(F) to read as follows:

210.8(F) Outdoor Outlets. All outdoor outlets for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less, shall have ground-fault circuit-interrupter protection for personnel.

...

Exception No. 2: Ground-fault circuit-interrupter protection shall not be required for listed HVAC equipment. This exception shall expire ~~September 1, 2026~~ September 1, 2028.

Proposed wording for the 2023 Edition:

1. Revise 210.8(F) Exception No. 2 to read as follows:

210.8(F) Outdoor Outlets. For dwellings, all outdoor outlets other than those covered in 210.8(A), Exception No. 1, including outdoor outlets installed at the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, shall be provided with GFCI protection:

...

Exception No. 2: Ground-fault circuit-interrupter protection shall not be required for listed HVAC equipment. This exception shall expire ~~September 1, 2026~~ September 1, 2028.

Proposed wording for the 2026 Edition:

1. Revise 210.8(F) Exception No. 2 to read as follows:

210.8(F) Outdoor Outlets. For dwellings, all outdoor outlets other than those covered in 210.8(A), Exception No. 1, including outdoor outlets installed at the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

...

Exception No. 2: GFCI protection shall not be required for listed HVAC equipment. This exception shall expire ~~September 1, 2026~~ September 1, 2028.

Substantiation: Despite ongoing efforts from the HVAC manufacturers and GFCI manufacturers, more time is needed to develop products compatible to the GFCI requirements listed in NFPA 70, Section 210.8(F). Certainly, the HVAC industry and the GFCI industry have made progress toward this transition. HVAC manufacturers are no longer requesting an extension to September 1, 2029. Rather, HVAC manufacturers request that Exception No. 2 be extended to September 1, 2028. This new date represents a compromise and will allow the HVAC industry to finish its work to ensure that the public is not adversely affected by these changes. Many HVAC manufacturers have been working with GFCI manufacturers to develop products that are compatible with each other, and this process will continue over the next several years.

AHRI is collaborating with Electric Power Research Institute (EPRI) on AHRI Report No. 8029, which is investigating the incompatibility of GFCI and HVAC systems. Phase II testing of this project was completed in early 2026.¹ The following are the preliminary results of this testing that will be reflected in the final AHRI Report No. 8029 due to be published and released in June 2026:

The preliminary testing results suggest that high-frequency leakage currents associated with inverter-based operation, especially during startup/transient windows, can interact with GFCI sensing algorithms in ways not fully addressed by existing standards.

During laboratory testing, a key issue was identified: when the injected frequency was sufficiently high, the series impedance required to achieve the target high-frequency (HF) current became low (on the order of tens of ohms), creating a non-negligible parallel path for 60-Hz line voltage. This resulted in measurable unintended 60-Hz differential current appearing at the GFCI sensing CT during injection. This introduced ambiguity regarding whether trips were caused by HF current, unintended 60-Hz leakage, or a combination of both.

Phase II analysis identified the fundamental-frequency leakage mechanism as an interaction between a front-end switching element (contactor) and common-mode filtering components. Specifically, when the contactor interrupted only one leg feeding the inverter/filter network, the common-mode choke could behave effectively as a transformer under the partially energized condition, producing a common-mode voltage on the downstream side and driving current through line-to-ground filter elements.

This mechanism was associated with large transient current spikes and voltage distortion when the contactor closed, including cases where neutral-to-ground voltage excursions and significant current spikes were observed with tripping propensity dependent on the timing of closure relative to the voltage waveform.

A simple component substitution at the equipment front end was proposed and manufacturer-approved prior to continuing the test campaign. After the change, the equipment operated as intended, enabling collection of the high-frequency leakage current data required for the study.

However, these findings have not yet been shared with all manufacturers and additional time will be needed for product changes to be made based on this testing.

Phase II research found that:

GFCI devices exhibit wide variability in response to high-frequency differential current. Some devices trip at relatively low HF current magnitudes at specific frequencies, while others remain robust to the same stimulus (see attached Figure 4-7).

¹ AHRI Report No. 8029, Final Report anticipated publication in June 2026.

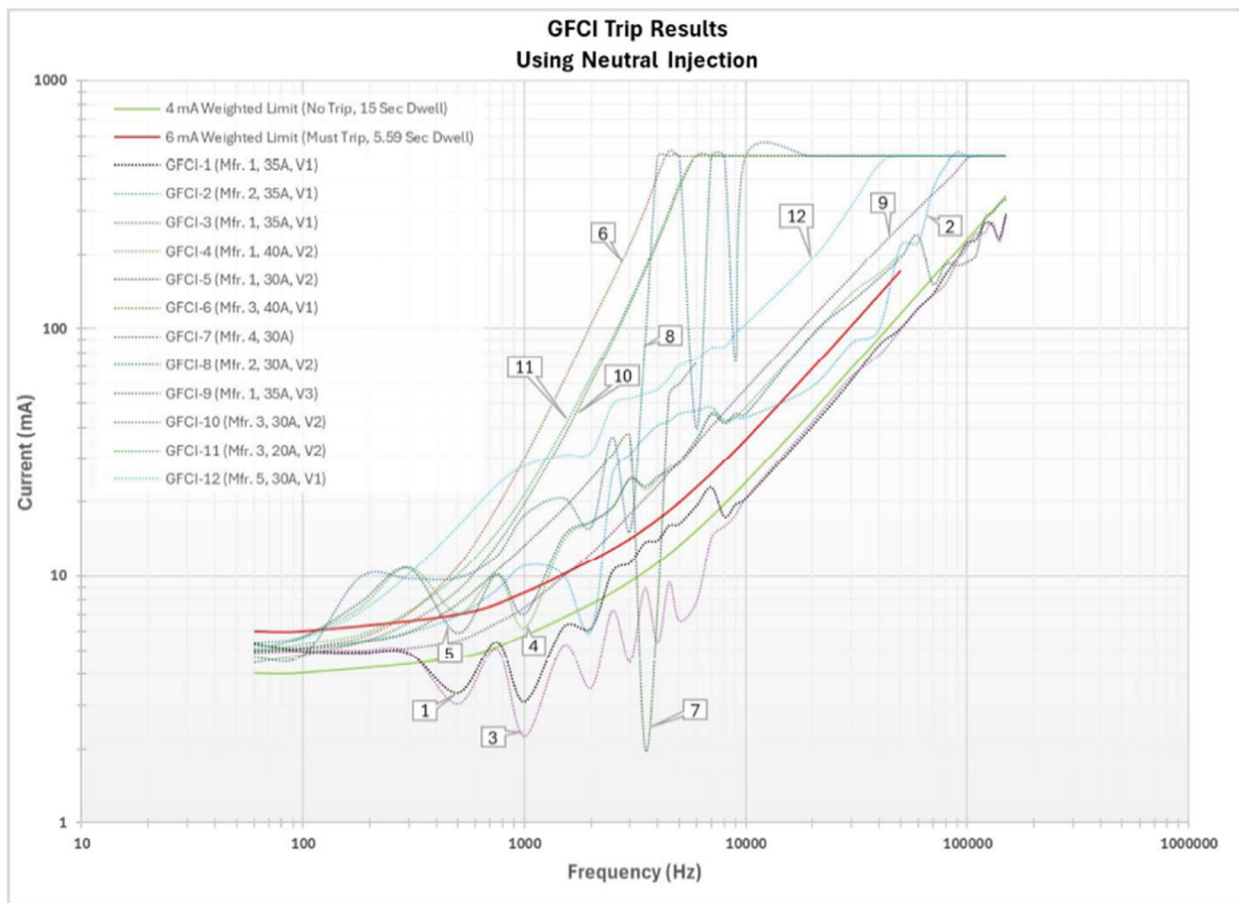


Figure 4-7. Spaghetti plot of all GFCI trip curves over proposed HF and HF+ requirements

Furthermore, startup conditions can elevate leakage magnitude, alter frequency content, or introduce brief low-frequency transients (e.g., inrush, contactor events) that momentarily push total “effective differential current” above the device threshold.

This framework explains why the same HVAC system may trip one breaker but not another, and why tripping may be more likely during particular startup scenarios rather than during steady-state operation.

Changes are needed to UL 60335-2-40, to which HVAC equipment is certified. The current 4th edition, published in 2022, does not address HF GFCI. UL can bridge the gap between GFCI/HVAC compatibility by harmonizing UL 943 and UL 60335-2-40. This is a possibility after HVAC manufacturers understand the incompatibility of GFCI and HVAC products, which illustrates the importance of the AHRI Report No. 8029 to inform these efforts.

AHRI’s research noted:

Not all standards-compliant GFCIs behave the same under HF conditions. Testing showed that some devices tolerate high injected currents at certain frequencies without tripping, while others trip at significantly lower levels.

The industry has been consistent dating back to the previous code cycle that 2026 would not be

sufficient time to make this transition and that 2029 is a more reasonable date. Similarly, the Standards Council appointed task group examined this issue and also acknowledged the potential inadequacy of the 2026 cutoff date. As stated in William Koffel's substantiation for Public Input 3619, "[t]he current exception was the result of TIA 23-3, developed by a Task Group of interested parties appointed at the direction of the Standards Council...[t]he substantiation for TIA 23-3 included the following statement indicating that the Task Group was well aware that the September 2026 may not be adequate and that a future extension may be necessary... '[t]he Task Group acknowledges that the date may need to be re-evaluated in the future if the incompatibility issues are not resolved.'"

In the NFPA 70 Technical Committee's response to Public Input 3619, which requested that the exemption for HVAC equipment be extended beyond September 2026, the entirety of the committee's substantiation for rejecting the change was "CMP-2 reaffirms the expiration date of September 1, 2026, to help drive urgency in resolving the problem of incompatibility." The committee has not provided any technical reason for why this extension cannot be granted. "Driving urgency" does not constitute technical justification and clearly this effort did not yield the committee's intended results.

AHRI Report No. 8029 Phase II data supports the premise that nuisance tripping can occur under normal, properly grounded operation due to frequency-dependent device/equipment interactions. Phase II results indicate that "one-size-fits-all" mitigation is unlikely; instead, solutions must be evaluated with respect to both equipment leakage spectrum and GFCI device frequency response.

Furthermore, 25 states, in their adoption of the NEC, have removed either the sunset date from Exception 2, clarified that HVAC equipment should be exempt from this section, or deleted the entire Section 210.8(F). This is further evidence that compatibility issues between HVAC products and GFCI are widely known. By issuing this TIA, NFPA can alleviate the burden on jurisdictions to make this decision by providing more time to complete the transition.

For all these reasons, AHRI strongly recommends the extension of Exception No. 2 to September 1, 2028 to allow HVAC and GFCI manufacturers to continue preparing for the transition to compatible products and minimizing the negative impact on the public and to allow UL 943 to update test procedures based on issues identified by AHRI and EPRI during this research project.

Emergency Nature: The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action. If Exception No. 2 is allowed to expire on September 1, 2026, and section 210.8(F) is enforced for listed HVAC equipment, residents will encounter nuisance tripping issues again as was the case when 210.8(F) was first brought into code in 2020. Sufficient time to resolve these compatibility issues has not been provided, despite repeated requests from the HVAC industry (i.e., manufacturers and contractors), as well as home builders. The approaching deadline illustrates

the emergency nature of this proposal. In TIA #1593 to the 2020 NEC, it stated: “In the state of Minnesota, we began enforcing Section 210.8(F) on April 5, 2021 and we have already documented many cases of operational tripping occurrences which have been difficult for inspectors and electricians to resolve. The only solution at this time is for the AHJ to approve a temporary allowance for the installation of a circuit breaker without GFCI protection so that these HVAC units can operate.” AHRI believes that enforcing this requirement on September 1, 2026, will create the same problems for AHJs. TIA #1593 further stated that “[d]elaying the implementation date allows for the affected stakeholders to reach a solution to the operational tripping occurrences and provides AHJs with the ability to permit installations of cooling equipment that is essential to the health and safety of residents in warm climates.” This also remains true and demonstrates why extending this date is of critical importance.

Anyone may submit a comment by the closing date indicated above. Please identify the TIA number, state whether you SUPPORT or OPPOSE the TIA along with your comment, and forward to the Secretary, Standards Council. [SUBMIT A COMMENT](#)