



Dawn Michele Bellis
Secretary, Standards Council

26 August 2022*

To: Interested Parties

Subject:

Standards Council Decision (Final):	D#22-4
Standards Council Agenda Item:	SC#22-8-5-y, 22-8-5-aa-1
Date of Decision:	12 August 2022
NFPA 70®, <i>National Electrical Code</i> ®, 2023 Edition	

Dear Interested Parties:

At its meeting of August 10-12, 2022, the Standards Council considered an appeal on the above referenced matter. The Council's Final decision is now available and is attached herewith.

Sincerely,

A handwritten signature in black ink that reads "Dawn Michele Bellis".

Dawn Michele Bellis
Secretary, NFPA Standards Council

cc: S. Everett, S. Gallagher, C. Duffy, J. Sargent
Members, NEC Code-Making Panel 6 (NEC-P06)
Members, NEC Correlating Committee (NEC-AAC)
Members, NFPA Standards Council (AAD-AAA)
Individuals Providing Appeal Commentary

*NOTE: Participants in NFPA's standards development process should know that limited review of this decision may be sought from the NFPA Board of Directors. For the rules describing the available review and the method for petitioning the Board for review, please consult section 1-7 of the Regulations Governing the Development of NFPA Standards and the NFPA Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council. Notice of the intent to file such a petition must be submitted to the Clerk of the Board of Directors within 15 calendar days of the publication date of this Decision.



Standards Council Decision (Final):	D#22-4
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SUMMARY OF ACTION (for convenience only; not part of official decision): The Standards Council voted to deny the appeal to overturn the results of the voting Association Members during the NFPA Technical Session and Accept an Identifiable Part of Committee Comment FR No. 8371 (CAM 70-126); Reject an Identifiable Part of Second Correlating Revision No. 43 (CAM 70-60); Accept an Identifiable Part of Committee Comment FR No. 8435 (CAM 70-127); Accept an Identifiable Part of Committee Comment FR No. 8427(CAM 70-128); and Accept an Identifiable Part of Committee Comment FR No. 8420 (CAM 70-129).

DECISION:

At its meeting of August 10-12, 2022, the Standards Council considered an appeal from Peter Graser of Copperweld Bimetallics, LLC regarding issuance of NFPA 70®, *National Electrical Code*®, 2023 Edition. In his appeal identified as agenda item 22-8-5-y, Mr. Graser sought Standards Council action to overturn the results of the voting Association Members during the NFPA Technical Session and Accept an Identifiable Part of Committee Comment (FR No. 8371 (CAM 70-126) which failed rebalancing of the responsible CMP at Second Draft stage)¹; and in his appeal identified as agenda item 22-8-5-aa-1, to overturn the ballot results of Code-Making Panel 6 on Certified Amending Motion 70-128, which had achieved the necessary support of the voting members during the NFPA Technical Meeting to Accept an Identifiable Part of Committee Comment FR No. 8427 for the 2023 Edition of NFPA 70, *National Electrical Code* (NEC). Specifically, the appeal requests revision of sections 310.3(A), 210.24, Table 210.24(2), 334.104, Table 310.16, Table 310.17, and 330.104 in the 2023 Edition of NFPA 70.²

As background, at its August 2019 meeting, the Standards Council heard appeals from Mr. Graser, who, at the time, was seeking the Council to overturn the results of the standards development process and require copper-clad aluminum to be listed, and also to add certain ampacities to the NEC for 14 AWG copper-clad aluminum. As part of its decisions in those appeals, the Standards Council formed a balanced bimetal task group (the “Bimetallic Task Group” or the “Task Group”) to “review the proposed changes to the 2020 edition of the NEC that relate to copper-clad aluminum conductors and recommend changes through a tentative interim amendment and/or provide public inputs for the next revision cycle”. See Standards Council Decisions D#19-2 and D#19-23.

The Bimetallic Task Group carried out its charge by the Council, and in the course of its work determined that testing was necessary to address unresolved questions that had been raised during Task Group meetings and by CMP 6 during the 2020 NEC revision cycle. One of the Task Group members arranged and executed

¹ As part of the filed appeal on CAM 70-126, Peter Graser sought Standards Council action on three related CAMs that he did not pursue at the Technical Meeting based upon his belief that differing results would have created correlation issues. Those three CAMs specifically were to: Reject an Identifiable Part of Second Correlating Revision No. 43 (CAM 70-60); Accept an Identifiable Part of Committee Comment FR No. 8435 (CAM 70-127); and Accept an Identifiable Part of Committee Comment FR No. 8420 (CAM 70-129).

² During the hearing on appeals, the Appellant requested that the Standards Council act upon these two appeals be acted upon in a single decision. Council has granted the Appellant’s request and therefore a single decision is being issued to act upon these two agenda items.

such testing at Eaton Laboratories from July-August 2020 (the “Eaton Test”). The Eaton Test focused on testing issues such as temperatures on terminals and conductors, wire-splicing devices, wiring devices, and “flexing durability” of 14 AWG copper-clad aluminum as more fully described in the report on the Eaton Test.³ The Eaton Test was performed comparatively on 14 AWG copper and 14 AWG copper-clad aluminum. The Task Group concluded that, for the specific temperature testing conducted in the Eaton Test, 14 AWG copper-clad aluminum had “terminal and conduct temperatures that were generally less than copper when tested at the 60 degree C ampacity values.” This Eaton Test served as the substantiation for a number of Public Inputs (PIs) developed by the Task Group in the 2023 revision cycle, including a series of PIs for consideration by CMP 6. The Task Group did not propose any tentative interim amendments based on their work.

At the First Draft Meeting in the 2023 cycle, CMP 6 accepted the Task Group’s PIs on sections that are the subject of this appeal and within CMP 6’s scope (Section 310.3,310.16, 334.104) (collectively, the “Affected Sections”). As a result, CMP 6 developed First Revision Nos. 8371, 8435, 8427, and 8435, which generally recognized the 14 AWG copper-clad aluminum as a minimum conductor size and also added 16 AWG copper as a recognized conductor size. These First Revisions passed ballot of CMP 6 by a vote of 11 affirmative and 2 negative. The two negative votes were from the representative of the Aluminum Association and the representative from the Copper Development Association. Both negative votes expressed concern about using smaller size conductors and the risk of overheating. The First Draft was posted online and made publicly available on June 28, 2021.

After the First Draft was posted, the document was opened for Public Comment (“PC”) through August 19, 2021. CMP 6 received several PCs on this technical issue, all of which raised concern about the temperature of 14 AWG copper-clad aluminum conductors in branch circuit applications. Substantiation for this line of PCs included reference to a test performed by Cerrowire Company at the Marmon Innovation and Technology Center (the “Cerrowire Test”), which tested the copper-clad conductors in thermal insulation, which was a materially different condition than that used in the Eaton Test. Cerrowire stated that its test was “terminated due to safety concerns” for high temperature. A test was also performed (and submitted as substantiation) by Southwire at D.B. Cofer Technology Center (the “Southwire Test”), which similarly raised concern about the high temperature of 14 AWG copper-clad aluminum. In the Southwire test, like in the Cerrowire Test, the 14 AWG copper-clad aluminum was tested in insulation because “Southwire believes testing in normal residential and commercial installation environments (within insulated walls and ceilings/attics) is also needed to properly assess the safety of 14 AWG copper-clad aluminum conductors at these ampacities.” The Copper Development Association reported on a test it performed at the Hampton Tedder facility, which tested 14 AWG copper clad-aluminum conductors in open air and insulation conditions (the “Copper Development Association Test”). The Copper Development Association reported similar conclusions about 14 AWG copper-clad aluminum exceeding accepted temperatures in thermal insulation, but noted the temperature did not exceed the threshold temperature in open air. As with the Southwire Test and Cerro Wire Test, the Copper Development Association Test did not include comparative testing of copper as the Eaton Test did.

At its Second Draft meeting, CMP 6 acted on and responded to all PCs, and also heard presentations on this issue from Mark Ode, on behalf of Copper Development Association; Dave Watson, on behalf of Southwire; Chuck Mello on behalf of Copperweld; and Christel Hunter, on behalf of Cerrowire. See Second Draft Meeting CMP 6 Chair Report. In addition, on October 25, 2021, a representative of Southwire emailed a report to all CMP 6 members, which analyzed a test it commissioned at Cable Technology Laboratories (the “Second Southwire Test”). The Second Southwire Test tested non-metallic sheathed cable (prototype NMB) in 14 AWG copper-clad aluminum in open air and in insulation. The summary from the Second Southwire Test generally was that the 14 AWG copper-clad aluminum in sheathed cable

³ The report on the Eaton Test is dated August 28, 2020 and was developed by Chuck Mello on behalf of the Bimetallics Task Group

was within an acceptable range of temperature, whereas 14 AWG copper-clad aluminum THHN conductors in metal conduit in insulation generally exceeded the acceptable temperature range.

After considering the PCs and numerous reports and presentations, CMP 6 reverted back to the 2020 edition of the NEC text of the Affected Sections, which effectively removed 14 AWG copper-clad aluminum and 16 AWG copper conductors in branch circuits. CMP 6's resolution statement for their actions at the Second Draft meeting on these Affected Sections stated, in part:

“to ensure public safety, further time is needed to study 14 AWG copper-clad aluminum and 16 AWG copper as minimum conductor sizes...after considering all the information and results presented in the reports, public inputs, and public comments, concerns were recognized about conductor overheating in common, everyday installations that need to be addressed prior to reducing the allowable branch circuit conductor size. Primarily, the evidence of excessive heat rise that occurs when wiring methods are installed in thermal insulation needs to be addressed...”

CMP 6 also cited concerns about voltage drop and outlined information that would need to be brought “from credible sources and qualified testing laboratories” to address all such concerns.

After the Second Draft Meeting, the Appellant conducted a test at Copperweld's Fayetteville, Tennessee facility from December 1-3, 2021. The test was performed by Copperweld and witnessed over live video by Intertek (the “Copperweld Test”). The Copperweld Test was performed “to compare the temperature performance of 14 AWG copper and 14 AWG copper-clad aluminum conductors under equivalent conditions...” Generally, the conclusion was the temperature of the copper conductors was higher than the copper-clad aluminum conductors in each condition tested. Since the Copperweld Test was conducted after the Second Draft Meeting, Appellant distributed it to CMP 6 members by attaching it to the Second Draft Ballot before the ballot was recirculated.

The Second Revisions made to revert to the text of the 2020 edition of the NEC on the Affected Sections failed the Second Draft ballot because it failed to receive the required two-thirds affirmative vote. The 8 supporters of the Second Revisions and 6 votes against the actions taken by CMP 6. The supporters of the proposal to revert to the 2020 text were the principal representing the American Chemistry Council (classified as “user”), the principal representing the Vinyl Institute (classified as “manufacturer”), the principal representing the National Electrical Contractors Association (classified as “installer/maintainer”), the principal representing the National Electrical Manufacturers Association (classified as “manufacturer”), the principal representing the Copper Development Association (classified as “manufacturer”), the principal representing the Aluminum Association (classified as “manufacturer”), the principal representing IEE-IAS/PES JTCC (classified as “user”) and the principal representing UL LLC (classified as “research/testing laboratory”). Four of the supporters commented on concerns such as the test laboratories had interests aligned with one or more parties, or managed by an independent organization, fire hazards in normal building construction and concerns about significant overheating.

The negative votes on the Second Revisions came from the principal representing the International Brotherhood of Electrical Workers (IBEW)(classified as “labor”), Copperweld (classified as a “manufacturer”), the principal representing the Independent Electrical Contractors Inc. (classified as “installer/maintainer”), the Chair of CMP 6, representing the International Association of Electrical Inspectors (classified as “enforcer”), the principal representing the Electric Light & Power Group/EEI (classified as “utility”) and the principal representing Intertek Testing Services (classified as “research/testing laboratory”). All negative votes sought to support the First Draft text, substantiated by the work of the Bimetallics Task Group. Most of the negative ballots also pointed out concerns that the Eaton Test was the only test that compared copper and copper-clad aluminum, and found no basis to reject inclusion of 14 AWG copper-clad aluminum when the Eaton Test suggested that perhaps 14 AWG copper reached a higher temperature in those conditions.

In summary, on the Second Draft Ballot, four manufacturers, one installer/maintainer, two users and one research/testing laboratory supported the change to revert to 2020 edition text and not include 14 AWG copper-clad aluminum and 16 AWG copper conductors in branch circuits. On the other hand, one manufacturer, one labor, one installer/maintainer, one enforcer, one utility and one research/testing laboratory opposed the change and sought to allow 14 AWG copper-clad aluminum and 16 AWG copper conductors in branch circuits. In NFPA's standards development process, when a Second Revision fails and there is a related First Revision, as was the case here, a Supplementary Ballot is conducted to determine whether the panel is in support of the related First Revision(s).

The Supplementary Ballot on First Revisions on the Affected Sections failed to achieve two-thirds affirmative votes. 5 members of CMP 6 voted in support of the First Revisions and 7 members of CMP 6 voted against the First Revisions. The CMP members in support of the First Revisions were one manufacturer, one research/testing laboratory, one installer/maintainer, one user, one labor. The CMP members against the First Revisions were four manufacturers, one installer/maintainer, one research/testing laboratory and one user. Pursuant to NFPA's standards development process, since the Supplementary Ballot of the First Revisions failed ballot, it was not included in the Second Draft. Instead, the related text automatically returns to previous edition text, which is the 2020 edition text of the NEC. The result yielded by the process is that the 14 AWG copper-clad aluminum and 16 AWG copper conductors in branch circuits would not be included in the 2023 NEC.

After the Second Draft posted on March 21, 2022, the Appellant (Mr. Graser) filed Notices of Intent to Make a Motion ("NITMAMs"), which were ultimately certified as CAMs 70-60, 70-126, 70-127, 70-128, and 70-129⁴ for consideration at the 2022 Technical Meeting. Mr. Graser attended the NFPA Technical Meeting on June 9, 2022 to move the CAMs. The first CAM he presented (based on the agenda) was 70-126 (which was about conductor sizes). Mr. Graser, the Chair of CMP 6, and three other individuals spoke for and against the motion. A representative of the IBEW stood to call the question after that, and ultimately, the motion narrowly failed by a vote of 196 in favor and 198 opposed. Mr. Graser then moved 70-128 (which was about ampacities related to copper-clad aluminum conductors). Mr. Graser, the Chair of CMP 6 and about ten other individuals spoke for and against the motion. The motion passed by a vote of 225 in support and 172 against. When the Presiding Officer proceeded with Mr. Graser's next motion on the agenda (CAM 70-129), Mr. Graser withdrew 70-129 and his remaining CAMs because he believed they were dependent on CAM 70-126, which had failed.

Pursuant to NFPA's standards development process, after the Technical Meeting, CAM 70-128 was balloted by CMP 6 and failed ballot by a vote of 8 in support CAM 70-128 and 5 opposed to CAM 70-128. The voting patterns and reasons mirrored that of the Second Draft ballot, except that one manufacturer who was previously opposed to including 14 AWG copper-clad aluminum at the Second Draft chose to abstain from the vote on CAM 70-128, citing "...conflicting data from different industries on opposite sides of this issue."

On appeal, the Council accords great respect and deference to the NFPA standards development process. In conducting its review, the Council will overturn the results of that process only where a clear and substantial basis for doing so is demonstrated.

During the 2023 revision cycle, CMP 6 reviewed at least 6 test reports regarding the technical issues at hand, including: the Eaton Test, the Cerrowire Test, the Southwire Test, the Copper Development Association Test, the Second Southwire Test and the Copperweld Test. These tests had many differences from one another: some compared copper and copper-clad aluminum, and most did not; some tested

⁴ Appellant filed other NITMAMs as well, but they are not part of this appeal and therefore not described in this Decision.

sheathed cable, or metallic conduit, and some did not; some conducted open air testing, some conducted testing in insulation, some conducted comparative testing in both open air and insulation.

As CMP 6 members recognized, the tests (or reports) reached disparate conclusions and were not conducted by impartial test laboratories. The Eaton Test was performed at Eaton's laboratory, and the report on the test was written by Chuck Mello, who identified himself as a consultant to Copperweld at the hearing on this Appeal. The Cerrowire Test was performed at the Marmon Center, and Cerrowire is a Marmon company. The Copper Development Association Test was performed by Hampton Tedder Technical Services, and one of the "Lead Testing Team Members" was an individual representing the Copper Development Association in a presentation before CMP 6. The Southwire Test was performed by Southwire at Southwire's own D.B. Cofer Technology Center. The Second Southwire Test was performed at an independent laboratory, but the background of the report states that Southwire designed the "non-standard test program" used and also provided its "prototype" materials. The Copperweld Test was likewise performed by Copperweld at its own facilities and witnessed remotely by Intertek.

The record reflects that a simple majority of CMP 6 found it difficult to ignore the four (out of six) reports raise a concern that acceptance of 14 AWG copper-clad aluminum may result in a fire hazard when installed in homes and commercial occupancies. CMP's statement at the Second Draft meeting noted an explicit concern for "public safety" given that these conductors could be used in "common, everyday installations." Branch circuit wiring may be used widely in insulated walls and ceilings in commercial and residential settings and 8 members of CMP 6 concluded that further study in insulation was needed from "credible sources and qualified testing laboratories." The record supports the reasoned, technical position of the majority.

The Appellant points out that the product test standard uses an open air test, and not an insulation test when measuring temperature. Six members of CMP 6 agreed that the sounder technical reasoning was to rely on the Eaton Test, which was an open air test on termination and connection points. The Eaton Test was the basis on which CMP 6 originally sought to allow 14 AWG copper-clad aluminum as a branch circuit wire, and reflected a technically substantiated response to CMP 6's concern at the end of the 2020 NEC revision cycle.

The Council finds the position of CMP 6 has technical substantiation and the record reflects continuing, legitimate debate over the serious concern about fire safety implications of using 14 AWG copper-clad aluminum and 16 AWG copper conductors in residential and commercial branch circuit wiring installations. For that reason, the Council will not substitute its judgment for the consensus body with expertise on this issue.

However, Council finds this technical matter requires timely, expert attention. Given the dedicated work and expertise brought by the Bimetallic Task Group, and given that most reports were received by CMP 6 after the Bimetallic Task Group completed its work, Council directs this Task Group to reconvene and (1) examine the tests and reports on the record, including the test methods and determine whether a tentative interim amendment (TIA) may be appropriate based on analysis of this information; and (2) develop the scope of a project to engage the Fire Protection Research Foundation to conduct independent reporting or testing sufficient to resolve the technical issues presented through this Appeal. Council directs the Bimetallic Task Group to report back to Council for its December 2022 meeting.

The Appellant also alleges that while CMP 6 is balanced by interest classification, the manufacturers on the panel who oppose the inclusion of 14 AWG copper-clad aluminum conductors in branch circuits also belong to other membership organizations on the panel and therefore effectively have more than one vote on the panel. Based on the graphic presented by the Appellant in the appeal and during the hearing, it appears that, as it pertains to CMP 6, this argument is focused on three members: Dave Watson of Southwire, representing the National Electrical Manufacturers Association (NEMA); Christel Hunter of

Cerrowire, representing the Aluminum Association; and Brian Deacy of Atkore International, representing the Copper Development Association. Atkore is a member of NEMA and the Copper Development Association; Cerrowire is a member of NEMA, Copper Development Association and the Aluminum Association and Southwire is a member of NEMA and Aluminum Association.

On CMP 6, the representatives of NEMA, the Aluminum Association and Copper Development all participate pursuant to a “directed vote” of their organizations. Each organization has a different approach for developing the direction on a vote. NEMA has approximately 325 member companies according to their website, and that includes the Appellant’s company, Copperweld. The Copper Development Association has approximately 36 full members and three associate members. Generally, on the NEC, members who represent a membership organization are valued participants because they bring to bear the collective view of their members (as opposed to the single view of one company). While each of the three identified CMP 6 members work for companies who are members of more than one trade or membership organizations, there was no evidence on the record that demonstrated they or their companies were a majority voice in more than one directed vote on CMP 6.

The Appellant also noted “early cloture of CAM 70-126” at the Technical Meeting to suggest that there was effort to restrict full debate on that CAM. However, the record reflects that the question was called by an individual representing the IBEW, which is also an organization who is represented on CMP 6 and the IBEW voted in support of keeping 14 AWG-copper-clad aluminum at the Second Draft. Absent any other information, the Council finds no reason to conclude that the representative of an organization that supported the requirements that were reflected in the CAM, would then seek to restrict debate.

The Council has reviewed the entire record concerning this matter and has considered all the arguments put forth in this appeal. In the view of the Council, this appeal does not present any clear and substantial basis upon which to overturn the results yielded by the NFPA standards development process. Accordingly, the Council has voted to deny the appeal. The effect of this action is that the NFPA 70, *National Electrical Code* will not include the text of CAMs 70-126, 70-60, 70-127, 70-128; and will not include the text of CAM 70-129.

Council Members John Kovacik and Rodger Reisinger themselves from the deliberations and vote on the appeal.

Council Members Michael Johnston and Jack Poole were not in attendance during the August 2022 meeting and therefore did not participate in the deliberations and vote on the appeal.