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MEMORANDUM

TO: Code-Making Panel 6

FROM: Sarah Caldwell, *Committee Administrator*

DATE: January 16, 2023

SUBJECT: NEC® Proposed TIA No. 1691 **Circulation of TC Ballots**

The **initial ballot results** of the TC balloting on proposed TIA No. 1691 are as follows:

15 **Eligible to Vote**
1 **Not Returned** (*Newman Scearce*)

Technical Merit:		**Emergency Nature:**	
1	Abstentions (*Hunter*)	0	Abstentions
8	Agree (*w/comment: Crisman, Earl, Graser*)	7	Agree (*w/comment: Graser*)
5	Disagree (*Deacy, Nielsen, Porcaro, Stene, Watson*)	7	Disagree (*Deacy, Earl, Hunter, Nielsen, Planas, Porcaro, Watson*)

There are two criteria necessary to pass ballot [(1) affirmative ¾ vote and (2) simple majority] with both questions needing to pass ballot in order to recommend that the Standards Council issue this TIA.

Therefore, based on the responses received to date the initial ballot results show that this TIA **IS NOT** passing ballot.

During the circulation period you may change your vote or submit your ballot through the NFPA online ballot system at the following link: NFPA Ballot Link**.**

Please complete the ballot on or before **January 23, 2023 by 11:59PM (ET).**

While completing your ballot, please remember the following:

- **A comment is required for both Question No. 1 and Question No. 2 for the online TIA ballot. Comments must accompany all Negative, Abstaining and Agree votes.**

- **If you vote "Agree" on Question 1, simply add "Agree" to the comment field and if you vote "Agree" on Question 2, insert the applicable letter(s) selections in the comment field which can be found in the Instructions box on the ballot site.**

You must hit SUBMIT to SAVE your work**. Note**: the system session will time you out after 45 minutes; any work not submitted at that time will not be saved! You may return to finish or change your ballot at any time up to the closing date. Ballot comments exceeding 4,000 characters must be submitted in a Word document via email, to Sarah Caldwell at scaldwell@nfpa.org.

Note: Please remember that the return of ballots and attendance at committee meetings are required in accordance with the Regulations Governing the Development of NFPA Standards.

NFPA 70®-2023 Edition
National Electrical Code®
TIA Log No.: 1691
Reference: Table 310.16
Comment Closing Date: February 10, 2023
Submitter: David Hittinger, Independent Electrical Contractors
www.nfpa.org/70

1. Revise Table 310.16 to read as follows:

Table 310.16 Ampacities of Insulated Conductors with Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried)

Size AWG or kcmil	Temperature Rating of Conductor [See Table 310.4(A)]						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, PFA, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN, Z, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN	
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			
18*	—	—	14	—	—	—	—
16*	—	—	18	—	—	—	—
14*	15	20	25	10†	—	—	14*
12*	20	25	30	15	20	25	12*
10*	30	35	40	25	30	35	10*
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	195	230	260	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	350	420	475	285	340	385	600
700	385	460	520	315	375	425	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	445	800
900	435	520	585	355	425	480	900

Size AWG or kcmil	Temperature Rating of Conductor [See Table 310.4(A)]						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, PFA, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN, Z, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN	
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	525	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	555	665	750	470	560	630	2000

Notes:
1. Section 310.15(B) shall be referenced for ampacity correction factors where the ambient temperature is other than 30°C (86°F).
2. Section 310.15(C)(1) shall be referenced for more than three current-carrying conductors.
3. Section 310.16 shall be referenced for conditions of use.
*Section 240.4(D) shall be referenced for conductor overcurrent protection limitations, except as modified elsewhere in the *Code*.

†Applicable only to copper-clad aluminum conductors.

Informational Note: See 300.26, 724.49, and Article 725, Part II for sizing of 18 AWG and 16 AWG copper and 14 AWG copper-clad aluminum control conductors as referenced in 330.104 and 336.104.

Substantiation: Changes to the location of code requirements for control conductors resulted in the omission of information required to determine the size and construction of non-power-limited conductors used in these applications. To provide clear direction to Code users, Table 310.16 is revised to direct Code users to the appropriate Code sections for control conductor sizing. In Table 310.16, 14 AWG copper-clad aluminum is added to recognize the permitted use of this conductor for control conductors. The inclusion of 14 AWG copper-clad aluminum for controls in 330.104 and 336.104 without also providing appropriate ampacity information leaves users of the code without the necessary information to make safe installations. While the addition of 240.4(D)(3) has some guidance, this is not where a user would go to find an ampacity. This language is intended to mirror the permitted uses that were in the 2020 NEC, with no technical changes. There are changes to the language to improve usability of the Code.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The NFPA Standard contains a conflict within the NFPA Standards or within another NFPA Standard. 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 of the action.

This information is essential to the correct sizing of non-power-limited control conductors. The misapplication due to lack of clarity of requirements can lead to installations with hazardous conditions, hence the emergency nature and the submission of this TIA.

NEC CMP-6 TIA No. 1691 Ballot Circulation Report
Election:70_A2025_NEC_P06_Log1691_TIABallot
Results by Revision

QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1691 to revise Table 310.16.

Eligible to Vote: 15
Not Returned : 1
Susan Newman Scearce

Vote Selection	Votes	Comments
Agree	8	
Timothy Earl		I agree that this oversight needs to be corrected, although I do not think this proposed solution is the best way to do it.
Joseph W. Cross		I agree with the content of this TIA.
Todd Crisman		I agree with the technical merits of the proposed TIA log No. 1691 to revise Table 310.16 including the notes to the table that reference the code sections that would be applicable.
Kenneth Riedl		Agree
Peter Graser		Ampacities are found in table 310.16, arguably the most referenced table by users in the NEC. Intuitively, users seek ampacity ratings there. Ampacity ratings are paramount to protecting circuits with over-current protection devices. Unless this TIA passes, there will be no other reference to ampacity for 14 AWG Copper-Clad Aluminum in the entire NEC, even considering the TIA from the Bimetals Task Group currently under consideration by panel 3. The inclusion of 14 AWG copper-clad aluminum for controls in 330.104 and 336.104 without also providing appropriate ampacity information leaves users of the code without the necessary information to make safe installations. Years of performance testing confirms that 14 AWG CCA @ 10 Amps is a safe conductor.
Gerald W. Kent		Agree
Kelly Lamp		Agree
Gonzalo Planas		Agree
Disagree	5	
Michael Thomas Porcaro		Ampere rating of CCA must be discussed with the CMP through normal course.

Susan L. Stene		Establishing the ampacity for 14 AWG copper-clad aluminum conductors used as signal conductors in Metal-clad cables (article 330) and Power and Control Tray cables (article 336) is beneficial. The requirements in Sec. 724.49 for Class 1 power-limited circuits point to the ampacity of Table 402.5 for copper conductors. This table shows an ampacity of 8 amps for 16 AWG copper conductors. Following the established practice of using the ampacity of an aluminum or copper-clad aluminum conductor as the same as the next-size smaller copper conductor, the ampacity of a 14 AWG copper-clad aluminum conductor should be the same as a 16 AWG copper conductor. This results in a value of 8 amps, not 10 amps as proposed. Furthermore, Sec. 240.4 (D)(3) requires that for a 14 AWG copper-clad aluminum conductor, the over-current protection shall not exceed 10 amps where the continuous load does not exceed 8 amps. This 8-amp value also correlates with the 8-amp value in Table 402.5
Dennis A. Nielsen		The table 310.16 with proposed modification to add amperage of 10 amps for Copper Clad Aluminum is in the column for types of TW and UF. TW is commonly used as Tracer Wire, and UF is for Underground Feeder. These are neither signal nor control conductor typical uses as was added in the NEC 2023 edition per 330.104 for type MC and 336.104 for type TC. This could cause misapplication including where UF is installed as a substitute wiring method for NM cable per Article 340.112.
Dave Watson		This proposal does not improve the usability of the NEC. In fact, by seeking to include ampacities for 14 AWG copper-clad aluminum signal and control conductors in Table 310.16, it proposes to treat these conductors differently than 18 AWG and 16 AWG copper conductors that have been used in the same application for decades. During this time, the overcurrent protection of 18 AWG and 16 AWG copper signal and control conductors has been addressed in Chapter 7, not in Table 310.16. Furthermore, overcurrent protection of small conductors has been covered in Section 240.4(D) for decades. Table 310.16 already includes a note stating that "Section 240.4(D) shall be referenced for conductor overcurrent protection limitations, except as modified elsewhere in the Code". And in the 2023 NEC, 240.4(D)(3) was added to provide overcurrent protection guidance specifically for 14 AWG copper-clad aluminum conductors. Consistent with prior voting, it is NEMA's assessment that the current content of the NEC adequately addresses the requirements for the use of copper-clad aluminum conductors in signal and control applications.
Brian Deacy		Control conductors smaller than 14 AWG copper or 12 AWG copper-clad aluminum are not sized based on Table 310.16, They are found in other sections of the code as stated in the TIA substantiation. This is more likely to cause confusion to the users of the NEC.
Abstain	1	
Christel K. Hunter		The Aluminum Association could not reach consensus on this issue.

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 15
Not Returned : 1
Susan Newman Scearce

Vote Selection	Votes	Comments
Agree	7	
Joseph W. Cross		A.
Todd Crisman		A
Kenneth Riedl		A, B
Susan L. Stene		A
Peter Graser		Clarity is paramount to safety. This TIA clearly identifies the ampacity rating of 14 AWG Copper-Clad Aluminum in the most referenced table in the NEC. Proper identification is given to 14 CCA in the proposal which limits its use to controls, which are in cases required to be circuit protected.
Gerald W. Kent		B
Kelly Lamp		The standard contains an error or an omission that was overlooked during the regular revision process.
Disagree	7	
Timothy Earl		This is a bit of a clunky fix and I believe the panel can do better. Therefore, I am voting negative so this can be addressed in the revision process for next cycle. Having this information in this table and relying on users to read the footnote and an informational note (which has no pointer in the table) could lead to misapplication. This is a case of getting it done correctly vs getting it done quickly. We need to do the former.
Christel K. Hunter		The informational note is useful but does not constitute an emergency.
Michael Thomas Porcaro		The proposed change as a TIA does not appear to have sufficient emergency nature to warrant the change outside of regular revision process. Additionally, as noted in the substantiation, language is provided in other code sections that provide guidance/clarity.
Dennis A. Nielsen		240.4 D (3) provides the protection requirements for #14 AWG Copper Clad Aluminum, also noted in the justification submitted with the TIA 1691. Therefore, this is not of an emergency nature.
Dave Watson		The substantiation provided for this TIA admits that 2023 NEC Section 240.4(D)(3) already provides guidance for the protection of 14 AWG CCA conductors. Given this fact, there is no need for an emergency resolution.

Brian Deacy		The substantiation provided says that the 2023 NEC already provides guidance for these conductors. Given this fact, there is no need for an emergency resolution.
Gonzalo Planas		The current table has larger sized conductors available to carry the needed load. In my opinion, the current table already has a minimum size allowed by the NEC. This proposal would lower that minimum size by allowing you to use a smaller conductor size. Therefore, in terms of emergency or safety issues, the already listed minimum conductor sizes would carry the same amount and/or more than what is proposed
Abstain	0	

A. The standard contains an error or an omission that was overlooked during the regular revision process.

B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

C. The proposed TIA intends to correct a previously unknown existing hazard.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

F. 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.