



Public Comment No. 117-NFPA 660-2023 [Global Input]

Replace the term "megohms per square" with "megaohms per square", and provide in parentheses the value in secondary units of ohms per square using scientific notation.

For example, the phrase "300 megohms per square" would become "300 megaohms per square (3 x 10⁸ ohms per square)

Statement of Problem and Substantiation for Public Comment

This change would standardize the terminology for surface resistivity measurements throughout the document. Both megaohm and megohm are found to be in common use, the term megaohm was selected as it uses the proper SI prefix. This was the result of a task group effort.

While the defined unit for surface resistivity is ohms per square, some equipment manufacturers use units of megaohms per square when describing the resistivity of belts for material handling.

An alternative approach would be to use the SI unit ohms per square as the primary unit, with megaohms per square as the secondary (parenthetical) unit.

Related Item

- FR-221

Submitter Information Verification

Submitter Full Name: Thomas Scherpa

Organization: DuPont

Street Address:

City:

State:

Zip:

Submittal Date: Fri Dec 22 09:29:57 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: The CMD-FUN committee agrees with the concept of adding the secondary units of ohms per square using scientific notation, but does not have any instances in Chapter 1-10 to add that to. The CMD-FUN committee does not agree with changing the terminology "megohms per square" to "megaohms per square" as it is not the terminology used in the industry. CMD-HAP: See SR 108. CMD-CMM: See SRs 172, 173. CMD-WOO: See SR 193. CMD-AGR: See SRs 230, 231, 232, 233.

**Public Comment No. 12-NFPA 660-2023 [Global Input]****Additional Proposed Changes**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._1.pdf	NFPA 660 CC Note No. 1.	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No 1. appeared in the First Draft Report in NFPA 660.

Review the terminology for fundamental, core, basic requirements. The preferred term is "fundamental

Related Item

- CC Note No. 1

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 10:37:04 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: See SR 84, 12. CMD-HAP: This terminology is not used anywhere in Chapters 13 or 15. CMD-CMM: This terminology is not used anywhere in Chapter 12. CMD-WOO: This terminology is not used anywhere in Chapter 14. CMD-AGR: This terminology is not used anywhere in Chapter 11.



Correlating Committee Note No. 1-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 08:37:59 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Review the terminology for fundamental, core, basic requirements. The preferred term is "fundamental".

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 13-NFPA 660-2023 [Global Input]**

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Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._11.pdf	NFPA CC Note No. 11	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 11 appeared in the First Draft Report in NFPA 660.

The Correlating Committee has formed a task group to review the definitions that are attributed to the Technical Committees other than CMD-FUN and determine if they should be applied fundamentally. If a Technical Committee believes that any definitions should remain specific to their chapter, they should make this known to the task group.

Related Item

- CC Note 11

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 10:58:54 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: The CMD-FUN committee has reviewed the proposals from the Definitions Task Group and is providing comments to the Correlating Committee through staff for the reassignment of definitions. This committee does not have the authority to reassign the definitions.-All committees have reviewed the definitions spreadsheet and provided comments as necessary. These will be included in the meeting minutes.CMD-CMM: See SR 174, 175, 176, 253, 179. CMD-WOO: See SR 194.



Correlating Committee Note No. 11-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 10:13:17 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee has formed a task group to review the definitions that are attributed to the Technical Committees other than CMD-FUN and determine if they should be applied fundamentally. If a Technical Committee believes that any definitions should remain specific to their chapter, they should make this known to the task group.

Ballot Results

✓ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 14-NFPA 660-2023 [Global Input]**

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Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._16.pdf	NFPA CC Note No. 16	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No.16 appeared in the First Draft Report in NFPA 660.

A task group is reviewing the definitions associated with the various types of AMS/Dust Collectors/Cyclones to determine if any revisions are needed.

Related Item

- CC Note No. 16

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:03:21 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: See SR 86. CMD-HAP: See SR 88. CMD-CMM: See SR 178. CMD-WOO: See SR 185. CMD-AGR: See SR 210.



Correlating Committee Note No. 16-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 11:27:07 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: A task group is reviewing the definitions associated with the various types of AMS/Dust Collectors/Cyclones to determine if any revisions are needed.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 15-NFPA 660-2023 [Global Input]**

Type your content here ...

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._2.pdf	NFPA CC Note No. 2	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No 2. appeared in the First Draft Report in NFPA 660.

When referring to fundamental requirements, the reference should be to "Chapters 1 through 9" not "Chapters 1 through 10", as Chapter 10 is reserved at this time.

Each chapter should leave X.10 reserved for potential future use, and renumber sections accordingly.

Related Item

- CC Note 2.

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:09:01 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Rejected

Action:

Resolution: CMD-FUN: See SR 71. CMD-HAP: See SR 109, 110. CMD-CMM: See SR 180. CMD-WOO: See SR 252. CMD-AGR: See SR 235.



Correlating Committee Note No. 2-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 08:45:53 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: When referring to fundamental requirements, the reference should be to "Chapters 1 through 9" not "Chapters 1 through 10", as Chapter 10 is reserved at this time.

Each chapter should leave X.10 reserved for potential future use, and renumber sections accordingly.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 16-NFPA 660-2023 [Global Input]**

Type your content here ...

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._22.pdf	NFPA CC Note No. 22	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 22 appeared in the First Draft Report in NFPA 660.

A task group is reviewing the various definitions for hazard and hazard areas:

- 3.3.27 Deflagration Hazard (CMD-WOO)
- 3.3.28 Deflagration Hazard Area (heading only)
- 3.3.28.1 Dust Explosion Hazard Area (CMD-HAP)
- 3.3.28.2 Dust Flash Fire Hazard Area (CMD-HAP)
- 3.3.37 Dust Explosion Hazard (CMD-FUN)
- 3.3.43 Explosion Hazard (CMD-WOO) (points to 3.3.37 Dust Explosion Hazard only)
- 3.3.47 Fire Hazard (CMD-FUN)

Related Item

- CC Note No. 22

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:13:15 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The task group provided recommendations in PC 232 and several others, but the changes to these definitions have been held for the next revision cycle because of its complexity. The Fundamentals Committee asks the Correlating Committee to form another task group with representatives from all of the Technical Committees to continue to align these definitions for implementation in the next edition.



Correlating Committee Note No. 22-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 13:17:35 EDT 2023

Committee Statement and Meeting Notes

Committee Statement:	A task group is reviewing the various definitions for hazard and hazard areas:
	3.3.27 Deflagration Hazard (CMD-WOO)
	3.3.28 Deflagration Hazard Area (heading only)
	3.3.28.1 Dust Explosion Hazard Area (CMD-HAP)
	3.3.28.2 Dust Flash Fire Hazard Area (CMD-HAP)
	3.3.37 Dust Explosion Hazard (CMD-FUN)
	3.3.43 Explosion Hazard (CMD-WOO) (points to 3.3.37 Dust Explosion Hazard only)
	3.3.47 Fire Hazard (CMD-FUN)

Ballot Results

✔ This item has passed ballot

18 Eligible Voters
3 Not Returned
13 Affirmative All
2 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Davis, Scott G.
Krbec, Jason
Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.
Creswell, Gregory F.
Edwards, Brian
Frank, Walter L.

Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Cholin, John M.

As I continue in the effort to develop annex text to support the requirement in Section 8.6.1, I become more convinced that precise definitions distinguishing between a "flash fire" producing effects that can be managed with FRG, from a building compartment deflagration, producing effects that exceed the protective capacity of FRG, are critical.

**Public Comment No. 17-NFPA 660-2023 [Global Input]**

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Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._24.pdf	NFPA CC Note No. 24	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 24 appeared in the First Draft Report in NFPA 660.

A task group is reviewing the various sections on filtering air that is returned inside the building or to air makeup systems (for example, 9.4.4.7, 11.9.4.4.7, 15.9.4.4.7) to clarify how to determine what filtration media will meet these requirements. Chapter 11 has g/m3, other chapters have requirements based on % of MEC.

Related Item

- CC Note No. 24

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:16:33 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: See SRs 3 and 4. CMD-CMM: See SR 181. CMD-WOO: See SR 195. CMD-AGR: See SR 236.



Correlating Committee Note No. 24-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 13:34:15 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: A task group is reviewing the various sections on filtering air that is returned inside the building or to air makeup systems (for example, 9.4.4.7, 11.9.4.4.7, 15.9.4.4.7) to clarify how to determine what filtration media will meet these requirements. Chapter 11 has g/m3, other chapters have requirements based on % of MEC.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 18-NFPA 660-2023 [Global Input]**

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Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._26.pdf	NFPA 660 CC Note. 26	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No 26. appeared in the First Draft Report in NFPA 660.

A task group is reviewing the use of "supported by a DHA, authorized by a DHA, permitted by a DHA, determined by a DHA, etc" throughout the standard and discuss what authority is given to the DHA author. Additionally, the task group will clarify the purpose of the DHA and risk assessment within the standard.

Related Item

- CC Note 26

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:27:00 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: Each committee reviewed several Public Comments from this task group and created SRs as necessary.



Correlating Committee Note No. 26-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 14:11:49 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: A task group is reviewing the use of "supported by a DHA, authorized by a DHA, permitted by a DHA, determined by a DHA, etc" throughout the standard and discuss what authority is given to the DHA author. Additionally, the task group will clarify the purpose of the DHA and risk assessment within the standard.

Ballot Results

✓ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 19-NFPA 660-2023 [Global Input]**

Type your content here ...

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._50.pdf	NFPA CC Note 50	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No 50. appeared in the First Draft Report in NFPA 660.

The following statement should be added to Chapter 1 and deleted from the industry and commodity-specific chapters: 13.1.1.4

The owner/operator shall be responsible for implementing the requirements in this chapter.

Related Item

- CC Note 50

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 11 11:31:44 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: CMD-FUN: See SR 5. CMD-HAP: See SR 111. CMD-CMM: There are no instances of this in Chapter 12. CMD-WOO: There are no instances of this in Chapter 14. CMD-AGR: There are no instances of this in Chapter 11.



Correlating Committee Note No. 50-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 07:18:38 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: The following statement should be added to Chapter 1 and deleted from the industry- and commodity-specific chapters:

13.1.1.4

The owner/operator shall be responsible for implementing the requirements in this chapter.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

12 Affirmative All

2 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Bujewski, Matthew J.

Agree with Mr. Cholin

Negative with Comment

Cholin, John M.

The text should refer to the whole standard, not just the chapter.

**Public Comment No. 30-NFPA 660-2023 [Global Input]**

Type your content here ...

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._93.pdf	NFPA 660 CC Note No. 93	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No.93 appeared in the First Draft Report in NFPA 660.

Clarify the use of "Reserved" in A.1.3, or replace the term "Reserved" with language such as a reference back to the Fundamentals section or "Refer to Fundamentals."

Create a pointer to A.1.3 in Chapter 1 and at the beginning of each industry- or commodity-specific chapter to ensure that users are aware of the guidance in A.1.3.

Related Item

- CC Note 93

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 09:26:38 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Rejected

Action:

Resolution: CMD-FUN: The CMD-FUN Committee does not agree with using "Reserved" throughout the document as a placeholder for numerical consistency. The committee does agree that the other committees should use terminology such as "no content", "for numerical consistency", or "refer to fundamentals" instead, and save the term "Reserved" for headings where text may be developed in the future. The CMD-FUN committee also does not agree with adding a pointer to A.1.3 to Chapter 1. The asterisk points to annex material already, and there should not be a precedent set to also refer the users to the annex in another way. CMD-HAP: Replace "Reserved" throughout the industry- or commodity-specific chapters with a term such as "Refer to Fundamentals", and add annex material to 1.6.4 explaining the use of the term. Section 1.6 should give the other chapters the power to add requirements in addition to those in Chapter 1 through 10 (1.6.5 only addresses subjects that are not specified). CMD-CMM: Keep "reserved"- it is used in other standards. Do not want a pointer- directions are fundamental. CMD-WOO: Keep as Reserved. Suggest that the CC adds explanation of the use of Reserved to A.1.3 for pointing to Fundamentals sections/alignment. CMD-AGR: Keep it as Reserved, but add a definition or explanation of what Reserved means. The way it is used in this standard is similar to how it is used in other NFPA standards. Does not agree with adding a reference to A.1.3 in chapter 11 because it is already referenced by the asterisk on 1.3.



Correlating Committee Note No. 93-NFPA 660-2023 [Global Input]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 16:53:29 EDT 2023

Committee Statement

Committee Statement: Clarify the use of "Reserved" in A.1.3, or replace the term "Reserved" with language such as a reference back to the Fundamentals section or "Refer to Fundamentals."

Create a pointer to A.1.3 in Chapter 1 and at the beginning of each industry- or commodity-specific chapter to ensure that users are aware of the guidance in A.1.3.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 21-NFPA 660-2023 [Section No. 1.1.3]****1.1.3**

This standard also addresses the ~~size reduction~~ processing of sulfur and the handling of sulfur in any form, as well as other hazards entailed in processing sulfur, in accordance with the scope of Chapter 13.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No_48.pdf	NFPA 660 CC Note No. 48	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No 48. appeared in the First Draft Report on First Revisions 234.

14.1.1.1 (which will be 13.1.1.1 after Chapter renumbering) was revised at the First Draft stage. Revise 1.1.3 to be consistent with 13.1.1.1; i.e., delete "size reduction" and replace with "processing."

Related Item

- FR No. 234

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 12 09:34:32 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: SR-6-NFPA 660-2024

Statement: This aligns with the change made to the scope of Chapter 13 in the First Draft stage.



Correlating Committee Note No. 48-NFPA 660-2023 [Section No. 1.1.3]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 07:13:15 EDT 2023

Committee Statement

Committee Statement: 14.1.1.1 (which will be 13.1.1.1 after Chapter renumbering) was revised at the First Draft stage. Revise 1.1.3 to be consistent with 13.1.1.1; i.e., delete “size reduction” and replace with “processing.”

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 32-NFPA 660-2023 [New Section after 1.1.4]****TITLE OF NEW CONTENT**

Combustible Dusts and Particulate Solids Not Otherwise Specified, to Chapter 1 (1.1.5?)

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._18.pdf	NFPA 660 CC Note No. 18	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 18 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-HAP: Add scope of Chapter 15, Combustible Dusts and Particulate Solids Not Otherwise Specified, to Chapter 1 (1.1.5?)

Related Item

- CC Note 18

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 09:36:17 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7-NFPA 660-2024

Statement: The other industry- or commodity-specific chapters are referenced in 1.1 already, and this completes the set of references.



Correlating Committee Note No. 18-NFPA 660-2023 [New Section after 1.1.4]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 11:35:33 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add scope of Chapter 15, Combustible Dusts and Particulate Solids Not Otherwise Specified, to Chapter 1 (1.1.5?)

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

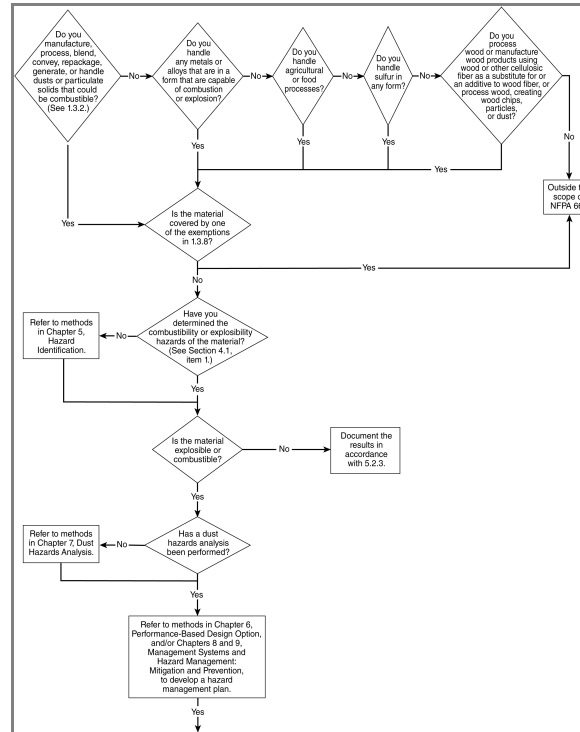


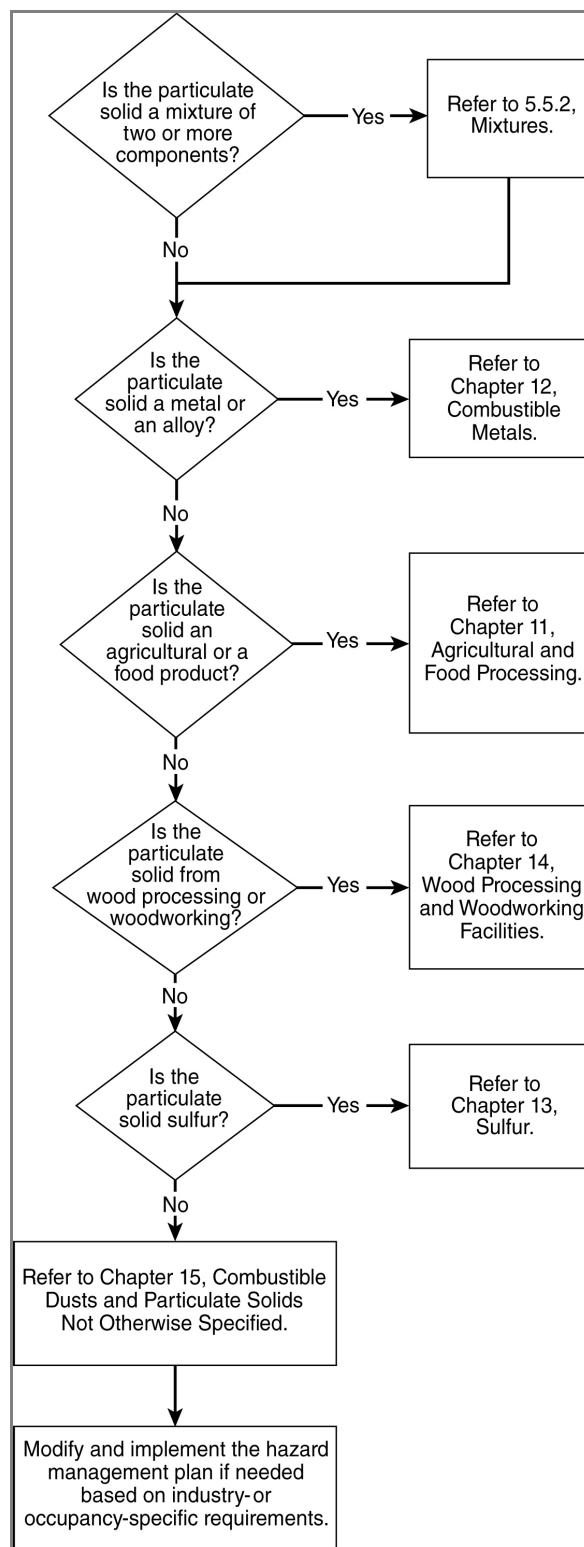
Public Comment No. 134-NFPA 660-2023 [Section No. 1.3.1]

1.3.1

The user shall be permitted to use Figure 1.3.1 for guidance when using this standard.

Figure 1.3.1 Document Flow Diagram for Combustible Dust Hazards Evaluation.





Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Figure_1.3.1_12-27-23_.pdf	Replacement for Figure 1.3.1	

Statement of Problem and Substantiation for Public Comment

The current Figure 1.3.1 does not accurately reflect the logic flow for implementing the requirements of the standard. It needs to be replaced with a figure that reflects the content of the uploaded file.

Related Item

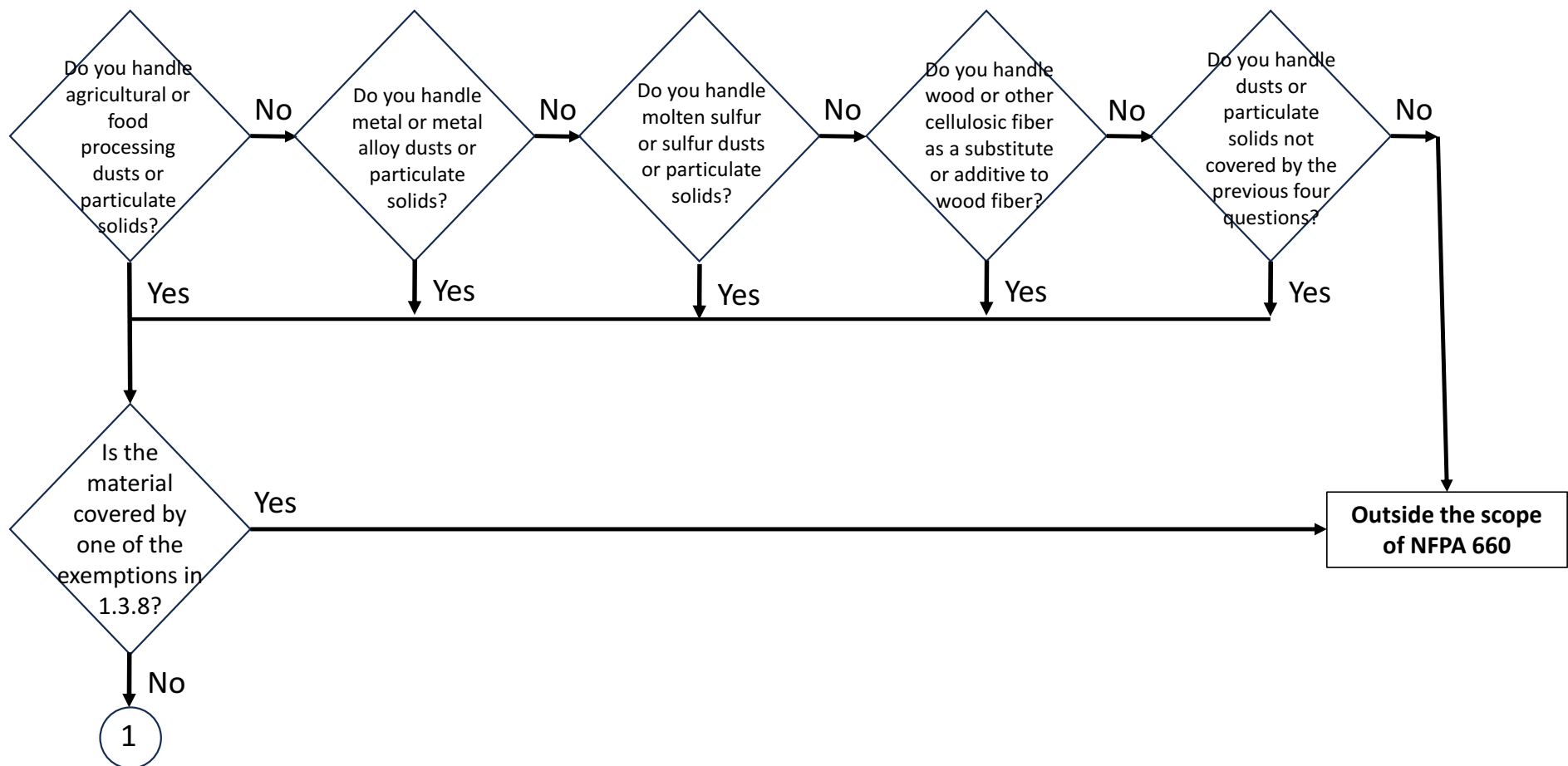
• FR-185

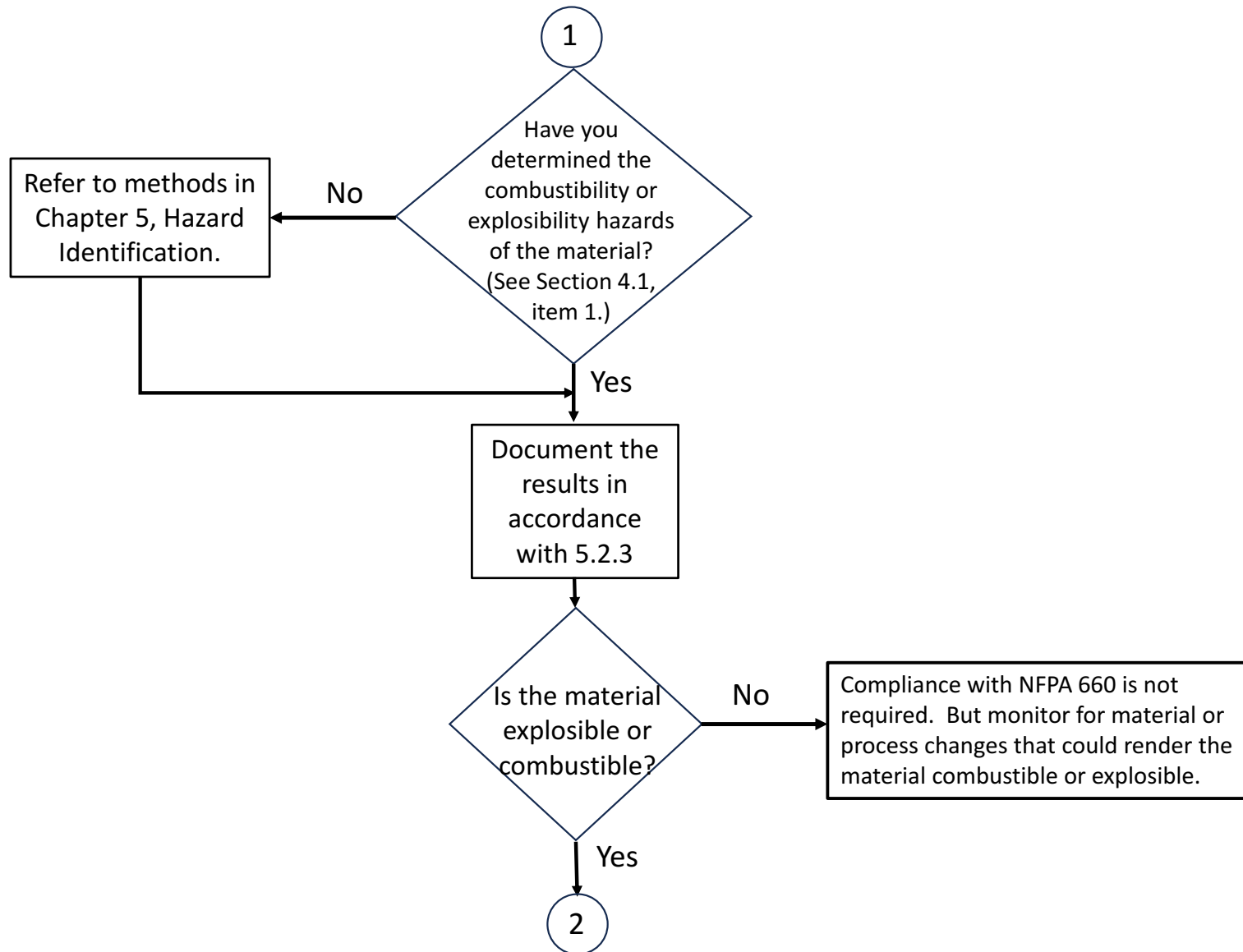
Submitter Information Verification

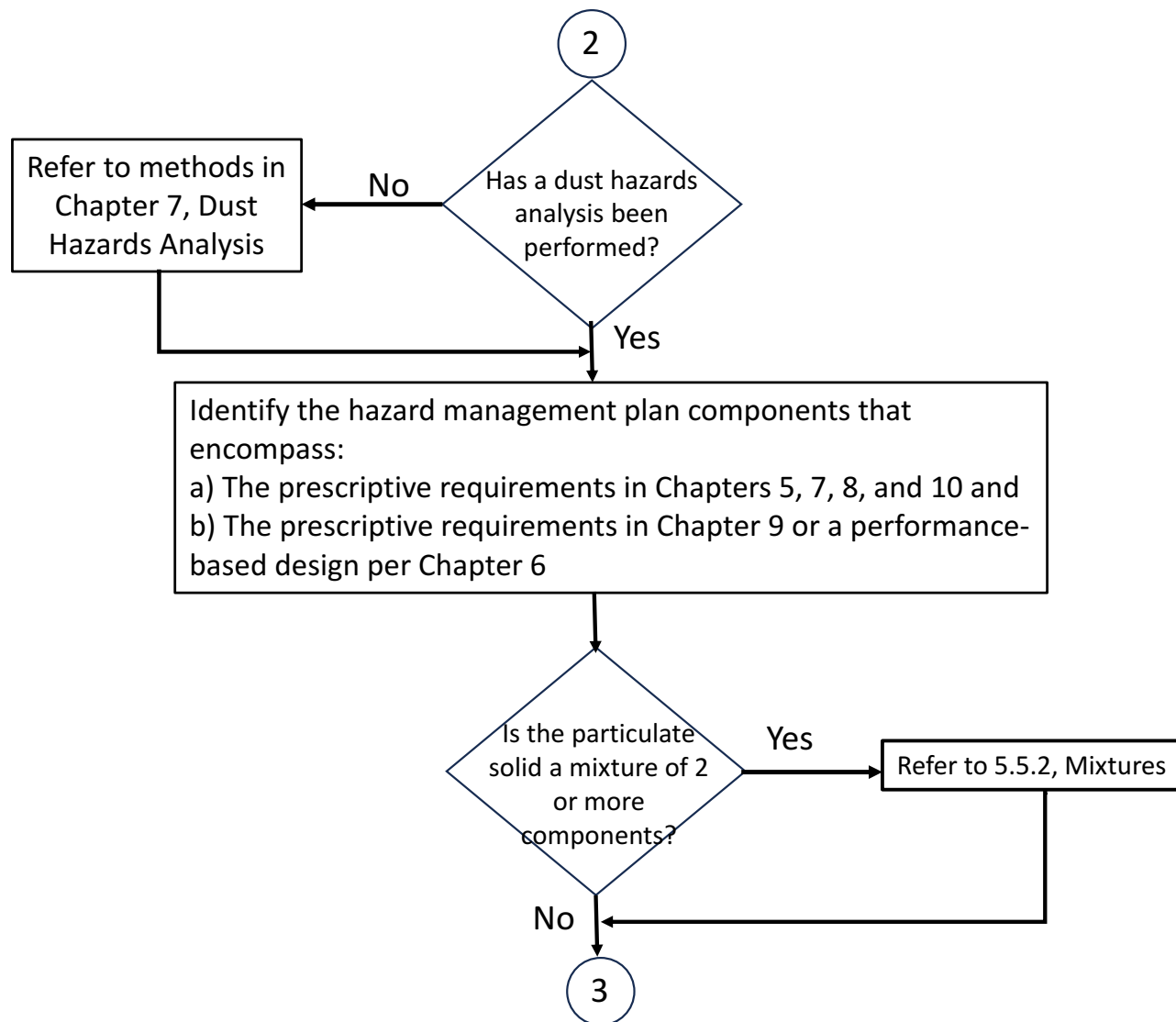
Submitter Full Name: Walter Frank
Organization: Frank Risk Solutions, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Dec 27 21:39:36 EST 2023
Committee: CMD-FUN

Committee Statement

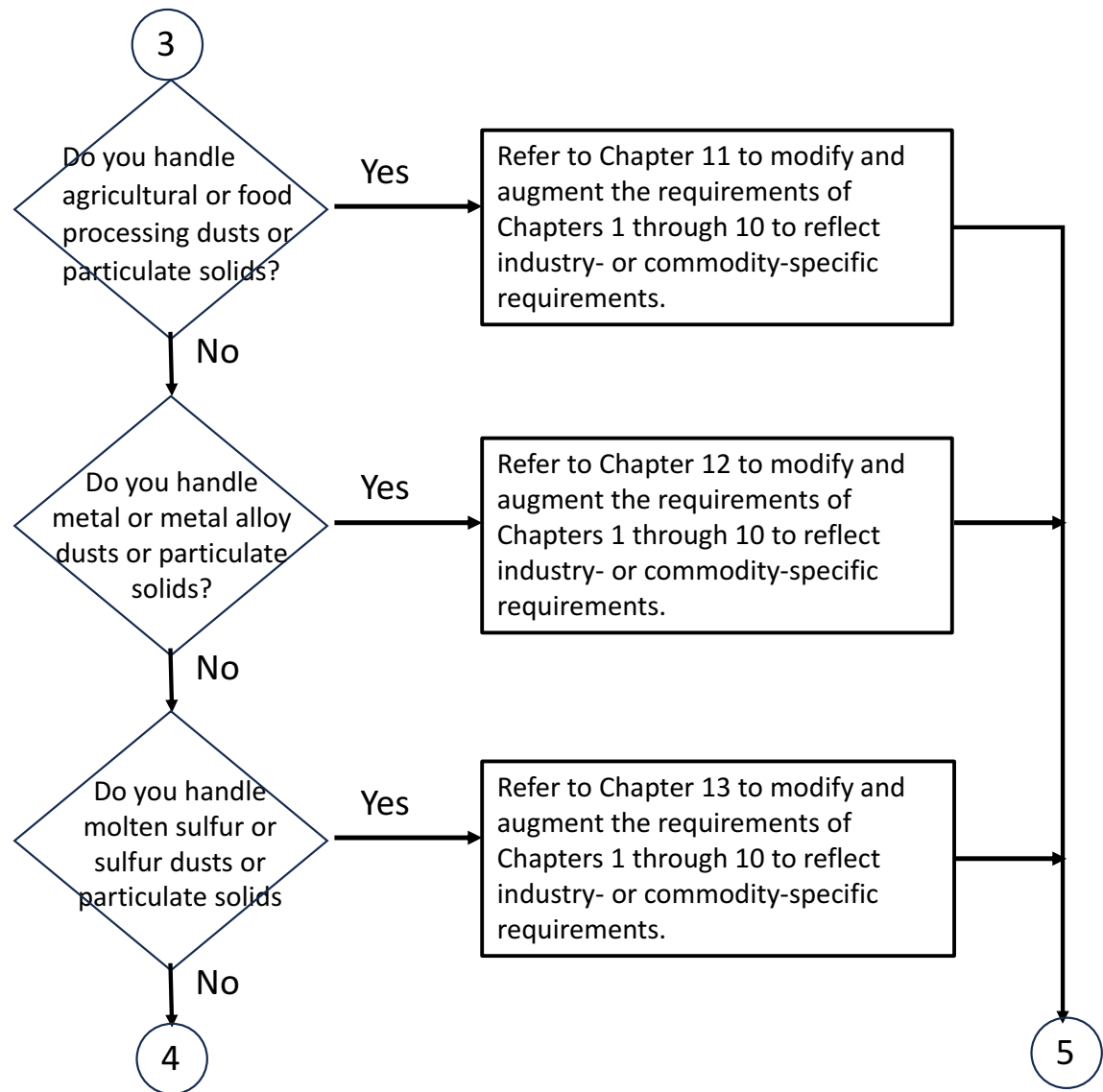
Committee Action: Rejected but see related SR
Resolution: [SR-8-NFPA 660-2024](#)
Statement: The current Figure 1.3.1 did not accurately reflect the logic flow for implementing the requirements of the standard.

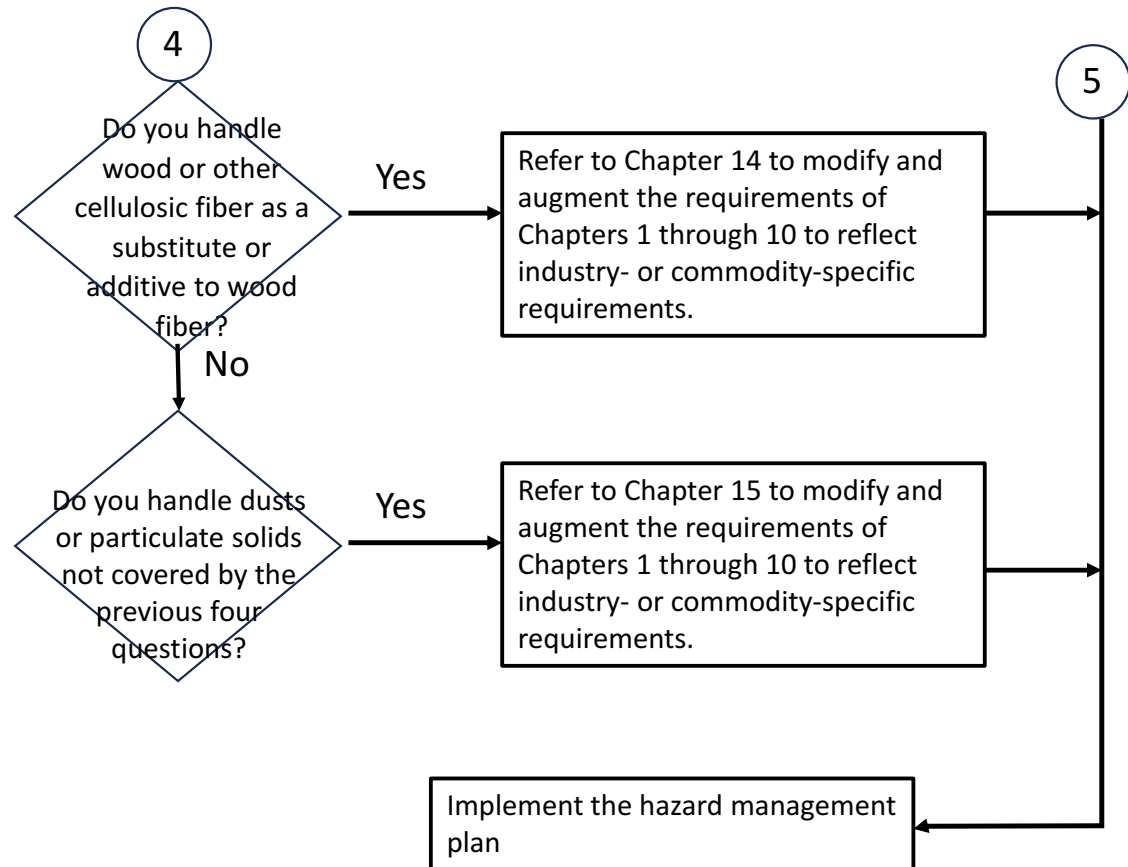






Note: this assumes that Chapter 10, Fire Protection is developed and included.





**Public Comment No. 33-NFPA 660-2023 [Section No. 1.3.8]****1.3.8**

This standard shall not apply to the following:

- (1) Storage or use of consumer quantities of such materials on the premises of residential or office occupancies
- (2) Storage or use of commercially packaged materials at retail facilities
- (3) Such materials displayed in original packaging in mercantile occupancies and intended for personal or household use or as building materials
- (4) * Warehousing of sealed containers of such materials when not associated with an operation that handles or generates combustible dust, except where covered in Chapter 12.
- (5) ~~Such materials stored or used in farm buildings or similar occupancies for on-premises agricultural purposes~~
- (6) Equipment and storage used on farms.

Add annex material:

A.1.3.8(5) Farms that do not fall under the scope of this standard may still have combustible dust hazards present and should still consider following portions of this standard that address those hazards depending on the level of risk.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._25.pdf	NFPA 660 CC Note No. 25	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 25 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-AGR: Recommend that 1.3.8(5) be changed from:

(5) Such materials stored or used in farm buildings or similar occupancies for on premises agricultural purposes

to: (5) Equipment and storage used on farms.

Add annex material:

A.1.3.8(5) Farms that do not fall under the scope of this standard may still have combustible dust hazards present and should still consider following portions

Related Item

- CC Note 25

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 09:40:06 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The CMD-FUN committee did not agree with exempting all equipment and storage on farms from this standard. The CMD-AGR committee should discuss this at their upcoming meeting and determine if a definition of farm (or size, etc) could be added to clarify this exemption.



Correlating Committee Note No. 25-NFPA 660-2023 [Section No. 1.3.8]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 13:57:49 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-AGR: Recommend that 1.3.8(5) be changed from:

(5) Such materials stored or used in farm buildings or similar occupancies for on-premises agricultural purposes

to: (5) Equipment and storage used on farms.

Add annex material:

A.1.3.8(5) Farms that do not fall under the scope of this standard may still have combustible dust hazards present and should still consider following portions of this standard that address those hazards depending on the level of risk.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 34-NFPA 660-2023 [Section No. 1.4.3]****1.4.3**

When renovating an existing facility, equipment, or process, the provisions of this standard shall apply retroactively to that portion of the facility, equipment, or process that is being modified.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._5.pdf	NFPA 660 CC Note No. 5	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 5 appeared in the First Draft Report on First Revisions No. 129 in NFPA 660.

In 1.4.3, consider replacing "renovate" with text such as "modified or added to" and consider quantifying the degree of modification required to trigger retroactivity.

Consider the following note from CMD-AGR: 1.4.3 - fundamentals should remove the word "retroactively" from "shall apply retroactively to that portion" because it is not clear what is meant by retroactive and when it applies to a change. You are not applying it retroactively you are applying the current standard to a modification, and not retroactively to something not changing.

Related Item

- FR No 129

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Wed Dec 13 09:55:20 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-9-NFPA 660-2024

Statement: This change improves clarity. It was not clear what was meant by renovating or applying changes retroactively. The facility might not have been covered by the standard previously, but the modification or addition could introduce new hazards that warrant coverage by the standard.



Correlating Committee Note No. 5-NFPA 660-2023 [Section No. 1.4]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 09:53:13 EDT 2023

Committee Statement

Committee Statement: In 1.4.3, consider replacing "renovate" with text such as "modified or added to" and consider quantifying the degree of modification required to trigger retroactivity.

Consider the following note from CMD-AGR: 1.4.3 - fundamentals should remove the word "retroactively" from "shall apply retroactively to that portion" because it is not clear what is meant by retroactive and when it applies to a change. You are not applying it retroactively- you are applying the current standard to a modification, and not retroactively to something not changing.

[FR-129-NFPA 660-2023](#)

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 35-NFPA 660-2023 [Section No. 1.7]****1.7 Units and Formulas.****1.7.1* SI Units.**

Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.7.2* Primary and Equivalent Values.

If a value for a measurement as given in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.7.3 Conversion Procedure.

SI units shall be converted by multiplying the quantity by the conversion factor and then rounding the result to the appropriate number of significant digits.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._40.pdf	NFPA 660 CC Note No. 40	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 40 appeared in the First Draft Report on First Revisions No. 16 in NFPA 660

Review the language from NFPA 30 regarding units of measure and consider for inclusion in Chapter 1:

1.6 Symbols, Units, and Formulas.**1.6.1**

The units of measure in this code are presented first in US customary units (inch-pound units). SI units (International System of Units) follow the inch-pound units in parentheses.

1.6.2

Either system of units shall be acceptable for satisfying the requirements in the code.

1.6.3

Users of this code shall apply one system of units consistently and shall not alternate between units.

1.6.4

The values presented for measurements in this code are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.6.5

Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

1.6.6

If a value for measurement given in this standard is followed by an equivalent value in other units, the first stated shall be regarded as the requirement. The given equivalent value shall be considered to be approximate.

Related Item

- FR No 16

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Wed Dec 13 09:59:56 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: These statements are already covered in 1.7 and the annex material.



Correlating Committee Note No. 40-NFPA 660-2023 [Section No. 1.7]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 15:39:29 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Review the language from NFPA 30 regarding units of measure and consider for inclusion in Chapter 1:

1.6 Symbols, Units, and Formulas.

1.6.1

The units of measure in this code are presented first in US customary units (inch-pound units). SI units (International System of Units) follow the inch-pound units in parentheses.

1.6.2

Either system of units shall be acceptable for satisfying the requirements in the code.

1.6.3

Users of this code shall apply one system of units consistently and shall not alternate between units.

1.6.4

The values presented for measurements in this code are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.6.5

Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

1.6.6

If a value for measurement given in this standard is followed by an equivalent value in other units, the first stated shall be regarded as the requirement. The given equivalent value shall be considered to be approximate.

FR-16-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Davis, Scott G.
Krbec, Jason
Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.
Cholin, John M.
Creswell, Gregory F.
Edwards, Brian
Frank, Walter L.
Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok



Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]

3.3.38* Dust Hazards

A.3.3.38 Dust Hazards

By its chemical nature combustible dust can be oxidized and generate heat and light. This process is called combustion. The combustion process can exist as a diffusion flame where the fuel and oxidizer are initially separated, and the oxidation reaction occurs in the zone where they mix. Combustion can also occur when the fuel and oxidizer are intimately mixed before ignition. This is referred to as a pre-mixed flame.

Combustion fed by a diffusion process can generate either smoldering combustion or flaming combustion. Smoldering combustion occurs at a slow rate and at lower temperatures when oxygen directly attacks the surface of a condensed phase fuel. This process can occur in finely divided fuels with large surface areas per unit mass or in porous fuels such as cellulose materials. Smoldering can evade detection for some time but when the surface is disturbed there is a transition to flaming combustion.

Flaming combustion is commonly seen as a fire where a solid or liquid fuel is pyrolyzed into flammable gases that burn where the gas and oxidizer mix. The speed of this process is controlled by the rate of pyrolysis of the fuels surface and rate of mixing of the gaseous fuel and oxidizer. In cases where the fuel and oxidizer are mixed before ignition, the speed of the combustion process is controlled by the chemical kinetics of the oxidation reaction and will be much faster than a diffusion flame and can produce a pressure rise within a fixed volume due to the fast rise in gas temperature.

Pre-mixed fuel-oxidizer mixtures are characterized by the speed of the flame front through the mixture. When the combustion zone is propagating at a velocity greater than the speed of sound in the unreacted medium it is referred to as a detonation. This type of event cannot be controlled without extreme measures. Most combustible dusts do not have flame speeds that can produce a detonation.

When the combustion zone is propagating at a velocity less than the speed of sound in the unreacted medium, it is referred to as a deflagration. Deflagrations are expected to occur if a suspended cloud of combustible dust above its minimum explosible concentration (MEC) is ignited. When a deflagration occurs within a fixed volume and the pre-mixed fuel-oxidizer mixture occupies enough of the volume, the gas temperature within that volume will quickly rise resulting in a fast pressure rise. If the fixed volume is not designed to provide a means to control the generated pressure, high temperature gas, and flame, the structure will fail. This fixed volume can occur in enclosed equipment or enclosed buildings. NFPA 68 and NFPA 69 provide generally accepted methods of controlling this type of event, considered to be an explosion.

If the pre-mixed fuel-oxidizer mixture occupies a limited percentage of the volume or is generated over a longer time-period (i.e., dust being entrained into a pressure wave moving through a building), the deflagration will still generate a large flame, but the overall pressure rise is less likely to cause severe structural damage to the fixed volume. This type of event will still produce a significant thermal load on anything inside the volume. As the fuel amount increases, the duration of the thermal load will increase. Personal protective equipment will likely provide some protection against a local, short duration flash fire but may not provide adequate protection against a long duration flash fire.

Combustible dusts are capable of producing smoldering combustion hazards, flaming combustion hazards, flash fire (local or wide area) hazards, equipment explosion hazards, or building explosion hazards. Figure A.3.3.38 provides an overview of the various combustion processes and associated hazards.

Figure A.3.3.38. Overview of Combustion Processes and Associated Hazards (See Attached File)

3.3.38.1 Fire Hazard

Any situation, process, material, or condition that can provide fuel for flaming or smoldering combustion. (CMD-FUN)

3.3.38.2 Local Area Flash Fire Hazard

Any situation that produces a suspended cloud of combustible dust occupying a limited volume of a building or structure, that will support a deflagration within the cloud. The volume of the pre-mixed combustible dust-air mixture is too small to generate damaging overpressures or extended combustion times within the building or structure. This scenario is commonly tied to the release of dust from dust handling equipment after an equipment explosion. Personal protective equipment is expected to offer some protection against this event. (CMD-FUN)

3.3.38.3 Building Compartment Flash Fire Hazard

Any situation that produces a suspended cloud of combustible dust occupying a large volume of a building/structure or can be fed by the entrainment of dust accumulated on building structures over a wide area that will support a deflagration within the building/structure. The volume of the pre-mixed combustible dust-air mixture, while large, is too small to generate damaging overpressures but will produce a long duration thermal load within the building. This scenario can be initiated by an explosion within dust handling equipment that vents into a building or structure with dust accumulations on structural elements. Personal protective equipment may not offer adequate protection against this event. (CMD-FUN)

3.3.38.4 Building Explosion Hazard

Any situation that produces a suspended cloud of combustible dust occupying a large volume of a building/structure or can be fed by the entrainment of dust accumulated on building structures over a wide area that will support a deflagration and generate damaging overpressure within the building/structure. The volume of the pre-mixed combustible dust-air mixture is large enough to produce overpressures that will cause the failure of building elements. This type of hazard is possible in building volumes that contain one or all the following:

- (1) Combustible dust suspended within the building volume.
- (2) Combustible dust deposits on building elements or equipment.
- (3) Combustible dust handling equipment located inside a building that is not properly protected against an explosion. (CMD-FUN).

3.3.38.5 Equipment Explosion Hazard

Any dust handling equipment that can produce a suspended cloud of combustible dust capable of supporting a deflagration. The volume of the pre-mixed combustible dust-air mixture will generate overpressures that will cause the equipment to fail and release pressure, high temperature gas, flame, and unburnt dust. The released unburnt dust can then combust outside the equipment. This type of hazard can exist in any piece of equipment handling combustible dust. (CMD-FUN)

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Figure_A.3.3.38.docx	Figure A.3.3.38	

Statement of Problem and Substantiation for Public Comment

NFPA 660 uses various terms to describe fire and explosion hazards. Unfortunately the mixing of these terms creates confusion on which hazard is being discussed. This new section provides a set of definitions that should be used throughout the standard to identify fire and explosion hazards. The terminology is intended to be consistent with how these hazards are identified in other NFPA standards and in fire engineering books.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 233-NFPA 660-2024 [Section No. 3.3.47]	
Public Comment No. 234-NFPA 660-2024 [Section No. 3.3.27]	
Public Comment No. 237-NFPA 660-2024 [Section No. 3.3.28]	
Public Comment No. 238-NFPA 660-2024 [Section No. 3.3.37]	
Public Comment No. 239-NFPA 660-2024 [Section No. 3.3.43]	
Public Comment No. 240-NFPA 660-2024 [Section No. 3.3.51]	
Public Comment No. 241-NFPA 660-2024 [Section No. 3.3.52]	
Public Comment No. 242-NFPA 660-2024 [Section No. A.3.3.47]	
Public Comment No. 243-NFPA 660-2024 [Section No. A.3.3.27]	
Public Comment No. 244-NFPA 660-2024 [Section No. A.3.3.28.1]	
Public Comment No. 245-NFPA 660-2024 [Section No. A.3.3.28.2]	
Public Comment No. 246-NFPA 660-2024 [Section No. A.3.3.37]	
Public Comment No. 247-NFPA 660-2024 [Section No. A.3.3.51]	
Public Comment No. 248-NFPA 660-2024 [Section No. A.3.3.52]	
Public Comment No. 249-NFPA 660-2024 [Section No. A.4.1]	
Public Comment No. 250-NFPA 660-2024 [Section No. 4.2.5]	
Public Comment No. 251-NFPA 660-2024 [Section No. 4.2.6]	
Public Comment No. 252-NFPA 660-2024 [Section No. 6.3.1]	
Public Comment No. 253-NFPA 660-2024 [Section No. 7.2.1]	
Public Comment No. 255-NFPA 660-2024 [Section No. A.7.2.1]	
Public Comment No. 256-NFPA 660-2024 [Section No. 7.2.2]	
Public Comment No. 257-NFPA 660-2024 [Section No. 7.3.1]	
Public Comment No. 258-NFPA 660-2024 [Section No. 7.3.3.3]	
Public Comment No. 259-NFPA 660-2024 [Section No. 7.3.4.2.1]	
Public Comment No. 260-NFPA 660-2024 [Section No. 8.4.5 [Excluding any Sub-Sections]]	
Public Comment No. 261-NFPA 660-2024 [Section No. 8.8.3.1]	
Public Comment No. 262-NFPA 660-2024 [Section No. A.8.8.3.1]	
Public Comment No. 263-NFPA 660-2024 [Section No. 8.9.3.4]	
Public Comment No. 264-NFPA 660-2024 [Section No. A.8.9.3.4]	
Public Comment No. 266-NFPA 660-2024 [Section No. 9.3.2.1]	
Public Comment No. 267-NFPA 660-2024 [Section No. 9.3.2.2 [Excluding any Sub-Sections]]	
Public Comment No. 268-NFPA 660-2024 [Section No. 9.3.3.1]	
Public Comment No. 269-NFPA 660-2024 [Section No. 9.3.3.2]	

[Public Comment No. 270-NFPA 660-2024 \[Section No. 9.3.5.1\]](#)
[Public Comment No. 271-NFPA 660-2024 \[Section No. 9.3.5.2.3\]](#)
[Public Comment No. 272-NFPA 660-2024 \[Section No. 9.3.5.3.1\]](#)
[Public Comment No. 273-NFPA 660-2024 \[Section No. 9.3.5.3.2\]](#)
[Public Comment No. 274-NFPA 660-2024 \[Section No. 9.3.5.3.3\]](#)
[Public Comment No. 275-NFPA 660-2024 \[Section No. 9.3.5.3.6\]](#)
[Public Comment No. 277-NFPA 660-2024 \[Section No. 9.3.5.4.2\]](#)
[Public Comment No. 278-NFPA 660-2024 \[Section No. 9.4.3.2.3\]](#)
[Public Comment No. 279-NFPA 660-2024 \[Section No. 9.4.3.3.5\]](#)
[Public Comment No. 281-NFPA 660-2024 \[Section No. 9.4.4.3\]](#)
[Public Comment No. 282-NFPA 660-2024 \[Section No. 9.4.4.6.1\]](#)
[Public Comment No. 283-NFPA 660-2024 \[Section No. 9.4.5.2\]](#)
[Public Comment No. 286-NFPA 660-2024 \[Section No. 9.4.6.3\]](#)
[Public Comment No. 287-NFPA 660-2024 \[Section No. 9.4.9.3.1\]](#)
[Public Comment No. 289-NFPA 660-2024 \[Section No. 9.4.9.3.2\]](#)
[Public Comment No. 290-NFPA 660-2024 \[Section No. 9.4.10\]](#)
[Public Comment No. 291-NFPA 660-2024 \[Section No. 9.4.12.2.4\]](#)
[Public Comment No. 293-NFPA 660-2024 \[Section No. 9.5.3.9\]](#)
[Public Comment No. 294-NFPA 660-2024 \[Section No. 9.6.3.2\]](#)
[Public Comment No. 295-NFPA 660-2024 \[Section No. 9.6.7.6\]](#)
[Public Comment No. 296-NFPA 660-2024 \[Section No. 9.6.11.3\]](#)
[Public Comment No. 297-NFPA 660-2024 \[Section No. 9.8.1\]](#)
[Public Comment No. 299-NFPA 660-2024 \[Section No. 9.8.2.1\]](#)
[Public Comment No. 300-NFPA 660-2024 \[Section No. A.9.8.2.1\]](#)
[Public Comment No. 303-NFPA 660-2024 \[Section No. 9.8.3.1\]](#)
[Public Comment No. 304-NFPA 660-2024 \[Section No. 9.8.3.3\]](#)
[Public Comment No. 305-NFPA 660-2024 \[Section No. 11.1.1\]](#)
[Public Comment No. 306-NFPA 660-2024 \[Section No. 11.7.3.1.2\]](#)
[Public Comment No. 307-NFPA 660-2024 \[Section No. 11.8.12.1.2\]](#)
[Public Comment No. 308-NFPA 660-2024 \[Section No. 11.9.3.5.3\]](#)
[Public Comment No. 310-NFPA 660-2024 \[Section No. 11.9.4.16.5\]](#)
[Public Comment No. 311-NFPA 660-2024 \[Section No. 11.9.4.17.1.4\]](#)
[Public Comment No. 313-NFPA 660-2024 \[Section No. 11.9.4.17.3.4\]](#)
[Public Comment No. 315-NFPA 660-2024 \[Section No. 11.9.4.17.4.4\(F\)\]](#)
[Public Comment No. 318-NFPA 660-2024 \[Section No. 11.9.4.19.1.2\(C\)\]](#)
[Public Comment No. 319-NFPA 660-2024 \[Section No. 11.9.4.20.1.2\]](#)
[Public Comment No. 320-NFPA 660-2024 \[Section No. 11.9.6.4.3\]](#)
[Public Comment No. 321-NFPA 660-2024 \[Section No. 11.9.8.1.1.1 \[Excluding any Sub-Sections\]\]](#)
[Public Comment No. 323-NFPA 660-2024 \[Section No. 12.1\]](#)
[Public Comment No. 324-NFPA 660-2024 \[Section No. 13.1\]](#)
[Public Comment No. 325-NFPA 660-2024 \[Section No. 14.1\]](#)
[Public Comment No. 326-NFPA 660-2024 \[Section No. 15.1\]](#)

Related Item

- Modified content to new section 3.3.38

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 11:28:30 EST 2024
Committee: CMD-FUN

Committee Statement

**Committee
Action:**

Rejected but held

Resolution:

This concept is being held for the next revision cycle because of its complexity, and it cannot be properly handled within the timeframe for processing the second draft.

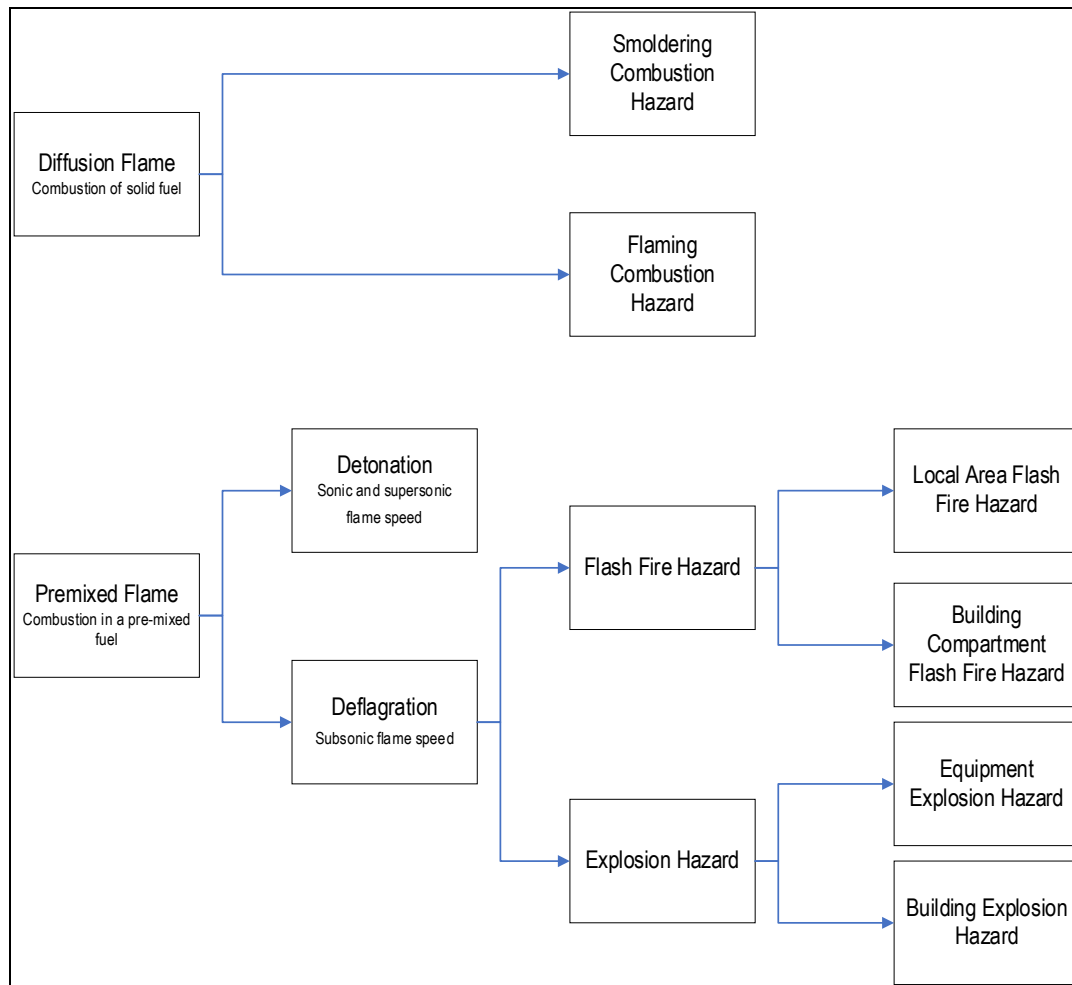


Figure A.3.3.38. Overview of Combustion Processes and Associated Hazards

**Public Comment No. 82-NFPA 660-2023 [Section No. 3.3.5]**

3.3.5* Air-Material Separator (AMS). - A device designed to separate the conveying air from the material being conveyed. (CMD-FUN)

3.3.5.1 – Enclosureless AMS.

An air-material separator designed

* Cyclone. A device which uses geometry (i.e., shape) and centrifugal force to separate material from the conveying air/gas flow. (CMD-WOO)

3.3.5.2* Dust Collector. A device that uses filter media to separate the conveying air/gas from the material being conveyed. (CMD-HAP)

3.3.5.3* Filter Receiver. A dust collector designed for a higher pressure/vacuum and higher material flow rate.

3.3.5.4* Scrubber. A device that uses liquid to separate the conveying air /gas from the material being conveyed where the filter media are not enclosed or in a container

.

3.3.5.5* Electrostatic Precipitator. A device that utilizes differences in electrical charges to remove fine particulates from the air/gas stream.

3.3.5.6* Final Filter. A device used as a separation device to increase filtration efficiency

3.3.5.7* Enclosureless AMS. A device using filter media for air and material separation but without any physical enclosure of the filter media. (CMD-FUN)

3.3.5.8 Dry-Type Air Material Separator (AMS). See 3.3.5.2 Dust Collector (CMD-FUN)

3.3.5.9 Media Collector. See 3.3.5.2 Dust Collector (CMD-CMM)

3.3.5.10 Wet-Type Air Material Separator. See 3.3.5.4 Scrubber. (CMD-FUN)

3.3.5.11 Point-of-Use Dust Collector. A bin vent-type of dust collector with an integral AMD used to create negative pressure on enclosed conveying equipment. (CMD-AGR)

3.3.5.12 Portable Air Material Separator (AMS). A portable device used as a dust collector. (CMD-FUN)

3.3.5.13* Portable Vacuum Cleaner. A movable assembly consisting of a vacuum source (AMD), AMS within an enclosure, and a vacuum hose, used to remove dusts and particles from surfaces. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

TG for definitions for AMS reviewed the various definitions of products that is an AMS and decided it would be easier for the public to understand the definition for each when these products was group together. Therefore, the products were placed as subchapter under AMS.

Related Item

- Work by TG on definitions for AMS

Submitter Information Verification

Submitter Full Name: Niels Pedersen

Organization: Nederman LLC

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City:

State:

Zip:

Submittal Date: Wed Dec 20 09:07:21 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-86-NFPA 660-2024](#)

Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.

**Public Comment No. 237-NFPA 660-2024 [Section No. 3.3.28]****3.3.28 – Deflagration Hazard Area.****3.3.28.1 * – Dust Explosion Hazard Area.**

A room or building volume where an unvented deflagration of the entrainable dust mass can result in a pressure exceeding the strength of the weakest structural element not intended to fail. (CMD-FUN)

3.3.28.2 * – Dust Flash Fire Hazard Area.

An area where combustible dust accumulation on exposed or concealed surfaces, external to equipment or containers, can result in personnel injury from thermal dose during a dust deflagration, as well as any areas where a dust cloud of a hazardous concentration exists. (CMD-HAP)

Statement of Problem and Substantiation for Public Comment

The new 3.3.38 replaces these definitions.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new 3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 11:54:26 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 85-NFPA 660-2023 [Section No. 3.3.33]****3.3.33 – Dry-Type Air-Material Separator (AMS).**

A device that does not use liquid to separate the material being conveyed from the conveying medium, such as cyclones or media collectors. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

Dry-Type Air Material Separator (AMS) has been moved to 3.3.5.8 as suggested by TG

Related Item

- FD report

Submitter Information Verification

Submitter Full Name: Niels Pedersen

Organization: Nederman LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 20 11:13:47 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-86-NFPA 660-2024](#)

Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.



Public Comment No. 238-NFPA 660-2024 [Section No. 3.3.37]

3.3.37 * – Dust Explosion Hazard.

~~A dust deflagration hazard in an enclosure that is capable of bursting or rupturing the enclosure due to the development of internal pressure from the deflagration. (CMD-FUN)~~

Statement of Problem and Substantiation for Public Comment

The new 3.3.38 replaces this definition.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to the new 3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 11:56:39 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 36-NFPA 660-2023 [Section No. 3.3.37]****3.3.37* Dust Explosion Hazard.**

A dust deflagration hazard in an enclosure that is capable of bursting or rupturing the enclosure due to the development of internal pressure from the deflagration. (CMD-FUN)

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._102.pdf	NFPA 660 CC Note No. 102	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 102 appeared in the First Draft Report on First Revisions No. 285 in NFPA 660

Consider the following note from CMD-WOO: Consider adding annex from explosion hazard definition to the dust explosion hazard definition in 3.3.37.

A.3.3.43 Explosion Hazard.

An explosion hazard exists in an enclosure of any type, including but not limited to silos, dust collectors, enclosed conveyors, bins, bunkers, rooms, and buildings where there is a deflagration hazard. (CMD-WOO)

Related Item

- FR No 285

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Wed Dec 13 10:06:57 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-11-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 102-NFPA 660-2023 [Section No. 3.3.37]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:21:15 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Consider the following note from CMD-WOO: Consider adding annex from explosion hazard definition to the dust explosion hazard definition in 3.3.37.

A.3.3.43 Explosion Hazard.

An explosion hazard exists in an enclosure of any type, including but not limited to silos, dust collectors, enclosed conveyors, bins, bunkers, rooms, and buildings where there is a deflagration hazard. (CMD-WOO)

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 37-NFPA 660-2023 [Section No. 3.3.37]****3.3.37* Dust Explosion Hazard.**

A dust deflagration hazard in an enclosure that is capable of bursting or rupturing the enclosure due to the development of internal pressure from the deflagration. (CMD-FUN)

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No_9.pdf	NFPA 660 CC Note No. 9	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 9 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-HAP: CMD-HAP recommends that the correlating committee (or FUN) change "flash fire" to "deflagration" in A.3.3.37 Dust Explosion Hazard

Related Item

- CC Note 9

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:10:26 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-11-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 9-NFPA 660-2023 [Section No. 3.3.37]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 10:04:52 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: CMD-HAP recommends that the correlating committee (or FUN) change "flash fire" to "deflagration" in A.3.3.37 Dust Explosion Hazard

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok



Public Comment No. 199-NFPA 660-2024 [Section No. 3.3.45]

3.3.45 * – Fibers/Flyings.

Elongated particulate solids having one or more dimension greater than 500 µm. (CMD-FUN)

3.3.45.1 * – Combustible Fibers/Flyings.

Fibers/flyings

that present a flash fire or explosion hazard

, where any dimension is greater than 500 µm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature.

(CMD-FUN)

[499, 2021]

3.3.45.2 * – Ignitable Fibers/Flyings.

Fibers/flyings

that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can

, where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard.

(CMD-FUN)

[499, 2021]

Statement of Problem and Substantiation for Public Comment

Standards Council Decision No. 18-4-26 directed the Technical Committees relating to combustible dusts, hazardous area classification, and electrical installations to form a task group to resolve conflicts in provisions relating to combustible metal dusts in codes, standards and recommended practices NFPA 70, NFPA 484, NFPA 499, NFPA 652 and NFPA 654.

The task group was formed and met by webinar. The TG meetings were chaired by the chairman of the National Electrical Code Committee (NEC-AAC). Members of the TG included the Chairs of the Combustible Dust Correlating Committee (CMD-AAC), Committee on Fundamentals of Combustible Dusts (CMD-FUN), Committee on Combustible Metal Dusts (CMD-CMM), Committee on Electrical Equipment in Chemical Atmospheres (EEC-AAA), National Electrical Code Committee Code-Making Panel 14 (NEC-P14), as well as voting members of CMD-FUN, CMD-CMM, EEC-AAA and NEC-P14. EEC-AAA also provided cross-committee participants to the TG, as the Chair is a Principal member of NEC-P14, and three Principal members are also members of CMD-FUN and CMD-CMM. Meetings were facilitated by the NFPA Staff Liaison for EEC-AAA, and the staff liaison for CMD-AAC and NEC-P14 also participated in the discussions. This task group, termed the Joint Task Group following, developed the TIAs for NFPA 499, NEC, NFPA 484, NFPA 652 and NFPA 654 to address the issues.

1) It is recommended to delete the definition of Fibers/Flyings as proposed in FR-19.

The very goal of the Joint Task Group was to coordinate combustible dust definitions to the maximum extent possible and facilitate proper installation of electrical equipment under the Division and Zone systems, removing the dust committees concerns with Zone system definitions. This was achieved with the TIA. While this definition of Fibers/Flyings does not detract from the proper understanding of either Combustible Fibers/Flyings or Ignitable Fibers/Flyings, the removal of the particle size from the two other definitions causes them to be different from those incorporated in the NEC. This is an arbitrary change which can only serve to confuse the users.

2) It is recommended to retain the original definition of Ignitable Fibers/Flyings as included in the TIA and delete FR 439.

In FR 439, the committee changed the definition of Ignitable Fibers/Flyings from "Fibers/flyings ... which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard" to "Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce an ignitable layer fire hazard." The committee essentially replaces "not likely to be in suspension to produce an explosible mixture" with "do not present a flash fire or explosion hazard". Concerning the elimination of the phrase "explosible mixture", please see the comment on FR 440.

The committee substantiation of this proposed change is, in part, "the phrase "not likely to be in suspension" is both subjective and not inherent to the properties of the material, meaning that a given form of material could be an ignitable fiber/flying in one location but a combustible fiber/flying in another." To this observation I say, but that is just the point. A material that is released initially as discrete combustible fibers/flyings can become unlikely to be suspended in air by agglomeration, intermingling on the retaining surface, action of humidity or adhesion of fiber finishes as are typically used in fiber-producing operations. Thus a material that is easy to suspend when released can quickly or over a longer period become "not likely to be in suspension". The subjective nature of this determination is certainly true, however, the implication that this is somehow related to the expert opinion on whether air currents or traffic patterns in a particular location are sufficient to determine electrical classification is not the case. In fact, looking at NFPA 499, it is clear that the depth of material alone is the criterion for establishing the Division or Zone classification. Likelihood of an external disturbance is not a factor.

Ignitable Fiber/Flyings have been a part of the NEC for decades. The NEC has a long history of successfully using the phrase “not likely to be in suspension” to permit users to differentiate the need for Class II or Class III electrical installations. The Joint Task Group chose to retain this phrase, “not likely to be in suspension”, when adding the new term Combustible Fibers/Flyings in order to coordinate with the dust committees’ need to recognize non-spherical, larger dimensioned, explosible materials. This is due, in part, to Ignitable Fibers/Flyings having additional surface temperature limitations because they are less likely to be routinely displaced and replaced. Except for Combustible Metal Fibers/Flyings, the electrical installation requirements for Combustible Fibers/Flyings and Ignitable Fibers/Flyings are the same – other than surface temperature limitations. Retention of this phrase is very important. Replacing this phrase will only serve to confuse the users.

3) It is recommended to retain the original definition of Combustible Fibers/Flyings as included in the TIA and delete FR 440.

In FR 440, the committee changed the definition of Combustible Fibers/Flyings from “Fibers/flyings ... which can form an explosible mixture when suspended in air” to “Fibers/flyings ... that present a flash fire or explosion hazard when suspended in air”. While this change inserts a parallel language to the historical definition of combustible dust, the committee statement that this change “replaces the nebulous phrase “can form an explosible mixture”” is not consistent with the very ASTM test standard used to determine this characteristic of a material. ASTM E1226 is titled “Standard Test Method for Explosibility of Dust Clouds”. The phrase “can form an explosible mixture” is extremely well-defined in the ASTM standard and other test methods. This very relationship between the test method and the material being tested is one of the reasons the Joint Task Group chose the language “explosible” as included in the prior TIA. The 660 committee also developed a definition for “explosible” in the First Revision. Again, this is not a nebulous term, rather a very specifically defined test result. It is apparent that this proposed change is an arbitrary choice of the committee and does not have a technical justification. The Joint Task Group worked to provide consistency between the NEC and the dust standards on concerns with electrical classification, particularly for non-spherical particulate with the addition of the two terms, Combustible Fibers/Flyings and Ignitable Fibers/Flyings. This proposed and arbitrary change will reduce that consistency and potentially cause confusion among the users.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 218-NFPA 660-2024 [Section No. A.3.3.45]	
Public Comment No. 221-NFPA 660-2024 [Section No. A.3.3.45.2]	
<u>Related Item</u>	
• FR-19, FR-439, FR-440	

Submitter Information Verification

Submitter Full Name: Samuel Rodgers
Organization: Retired
Street Address:
City:
State:
Zip:
Submission Date: Tue Jan 02 14:33:33 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-12-NFPA 660-2024](#)
Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.

**Public Comment No. 223-NFPA 660-2024 [Section No. 3.3.45]****3.3.45* Fibers/Flyings.**

~~Elongated particulate solids having one or more dimension greater than 500 µm. (CMD-FUN)~~

3.3.45.1 * _ Combustible Fibers/Flyings.

~~Fibers/flyings that present a flash fire or explosion hazard, where any dimension is greater than 500 µm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. (CMD-FUN 499, 2021)~~

3.3.45.2* Ignitable Fibers/Flyings.

~~Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. (CMD-FUN 499, 2021)~~

Statement of Problem and Substantiation for Public Comment

The definitions in the fibers/flyings sections should be returned to the definitions extracted from NFPA 499. A task group representing multiple standards and guidelines was appointed by the standards council to harmonize the definitions in multiple standards and guidelines and these modifications would again cause differences and conflicts between the standards and guidelines. If changes are required I would recommend they be proposed to the committee for the extract source, NFPA 499, and involve members of the standards council appointed task group to ensure that the definitions remain harmonized. It is not useful to define a general "Fibers/Flyings" without discussion of flammability or ignitability, as the definition would include many items that are not relevant to electrical classification (e.g. sheets of plywood, large blocks of metal). Similarly, we do not define dust or particulate solid, but only combustible dust or combustible particulate solid in the standard.

Related Item

- FR-19

Submitter Information Verification

Submitter Full Name: Timothy Myers

Organization: Exponent, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 16:42:04 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-12-NFPA 660-2024](#)

Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.



Public Comment No. 224-NFPA 660-2024 [Section No. 3.3.45]

3.3.45* Fibers/Flyings.

~~Elongated particulate solids having one or more dimension greater than 500 µm. (CMD-FUN) Fibers/Flyings are defined 3.3.45.1 and 3.3.45.2.~~

3.3.45.1* Combustible Fibers/Flyings.

~~Fibers/flyings that present a flash fire or explosion hazard, where any dimension is greater than 500 µm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. (CMD-FUN) [499 3.3.4.1]~~

3.3.45.2* Ignitable Fibers/Flyings.

~~Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. (CMD-FUN) [499 3.3.4.2]~~

Statement of Problem and Substantiation for Public Comment

The Committee Statement for FR19, FR439 and FR 440 is not technically correct.

Standards Council Decision No. 18-4-26 directed the Technical Committees relating to combustible dusts, hazardous area classification, and electrical installations to form a task group to resolve conflicts in provisions relating to combustible metal dusts in codes, standards and recommended practices NFPA 70, NFPA 484, NFPA 499, NFPA 652 and NFPA 654. The task group was formed and met by webinar. The TG meetings were chaired by the chairman of the National Electrical Code Committee (NEC-AAC). Members of the TG included the Chairs of the Combustible Dust Correlating Committee (CMD-AAC), Committee on Fundamentals of Combustible Dusts (CMD-FUN), Committee on Combustible Metal Dusts (CMD-CMM), Committee on Electrical Equipment in Chemical Atmospheres (EEC-AAA), National Electrical Code Committee Code-Making Panel 14 (NEC-P14), as well as voting members of CMD-FUN, CMD-CMM, EEC-AAA and NEC-P14. EEC-AAA also provided cross-committee participants to the TG, as the Chair is a Principal member of NEC-P14, and three Principal members are also members of CMD-FUN and CMD-CMM. Meetings were facilitated by the NFPA Staff Liaison for EEC-AAA, and the staff liaison for CMD-AAC and NEC-P14 also participated in the discussions. This task group, termed the Joint Task Group following, developed the TIAs for NFPA 499, NEC, NFPA 484, NFPA 652, NFPA 654 and NFPA 70 (2023 prior to publication) to address the issues. 1) It is recommended to delete the definition of Fibers/Flyings as proposed in FR-19. The very goal of the Joint Task Group was to coordinate combustible dust definitions to the maximum extent possible and facilitate proper installation of electrical equipment under the Division and Zone systems, removing the dust committees concerns with Zone system definitions. This was achieved with the TIA. While this definition of Fibers/Flyings does not detract from the proper understanding of either Combustible Fibers/Flyings or Ignitable Fibers/Flyings, the removal of the particle size from the two other definitions causes them to be different from those incorporated in the NEC. This is an arbitrary change which can only serve to confuse the users. 2) It is recommended to retain the original definition of Ignitable Fibers/Flyings as included in the TIA and delete FR 439. In FR 439, the committee changed the definition of Ignitable Fibers/Flyings from "Fibers/flyings ... which are not likely to be in suspension in quantities to produce an explosible mixture but could produce an ignitable layer fire hazard" to "Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce an ignitable layer fire hazard." The committee essentially replaces "not likely to be in suspension to produce an explosible mixture" with "do not present a flash fire or explosion hazard". Concerning the elimination of the phrase "explosible mixture", please see the comment on FR 440. The committee substantiation of this proposed change is, in part, "the phrase "not likely to be in suspension" is both subjective and not inherent to the properties of the material, meaning that a given form of material could be an ignitable fiber/flying in one location but a combustible fiber/flying in another." To this observation I say, but that is just the point. A material that is released initially as discrete combustible fibers/flyings can become unlikely to be suspended in air by agglomeration, intermingling on the retaining surface, action of humidity or adhesion of fiber finishes as are typically used in fiber-producing operations. Thus, a material that is easy to suspend when released can quickly or over a longer period become "not likely to be in suspension". The subjective nature of this determination is certainly true, however, the implication that this is somehow related to the expert opinion on whether air currents or traffic patterns in a particular location are sufficient to determine electrical classification is not the case. In fact, looking at NFPA 499, it is clear that the depth of material alone is the criterion for establishing the Division or Zone classification. Likelihood of an external disturbance is not a factor. Ignitable Fiber/Flyings have been a part of the NEC for decades. The NEC has a long history of successfully using the phrase "not likely to be in suspension" to permit users to differentiate the need for Class II or Class III electrical installations. The Joint Task Group chose to retain this phrase, "not likely to be in suspension", when adding the new term Combustible Fibers/Flyings in order to coordinate with the dust committees' need to recognize non-spherical, larger dimensioned, explosible materials. This is due, in part, to Ignitable Fibers/Flyings having additional surface temperature limitations because they are less likely to be routinely displaced and replaced. Except for Combustible Metal Fibers/Flyings, the electrical installation requirements for Combustible Fibers/Flyings and Ignitable Fibers/Flyings are the same – other than surface temperature limitations. Retention of this phrase is very important. Replacing this phrase will only serve to confuse the users. 3) It is recommended to retain the original definition of Combustible Fibers/Flyings as included in the TIA and delete FR 440. In FR 440, the committee changed the definition of Combustible Fibers/Flyings from "Fibers/flyings ... which can form an explosible mixture when suspended in air" to "Fibers/flyings ... that present a flash fire or explosion hazard when suspended in air". While this change inserts a parallel language to the historical definition of combustible dust, the committee statement that this change "replaces the nebulous phrase "can form an explosible mixture"" is not consistent with the very ASTM test standard used to determine this characteristic of a material. ASTM E1226 is titled "Standard Test Method for Explosibility of Dust Clouds". The phrase "can form an explosible mixture" is extremely well-defined in the ASTM standard and other test methods. This very relationship between the test method and the material being tested is one of the reasons the Joint Task Group chose the language "explosible" as included in the prior TIA. The 660 committee also developed a definition for "explosible" in the First Revision. Again, this is not a nebulous term, rather a very specifically defined test result. It is apparent that this proposed change is an arbitrary choice of the committee and does not have a technical

justification. The Joint Task Group worked to provide consistency between the NEC and the dust standards on concerns with electrical classification, particularly for non-spherical particulate with the addition of the two terms, Combustible Fibers/Flyings and Ignitable Fibers/Flyings. This proposed and arbitrary change will reduce that consistency and potentially cause confusion among the users.

Therefore, the definitions as published following the TIA's to their respective standards is technically correct. The definitions were based upon sound rationale of the use of the ASTM testing standards for the determination of the explosibility of dust clouds, as applied to fibers/flyings, as well as the subjective condition of ignitable fibers/flyings being relatively heavy and readily settle out of the air.

Using the TIA definitions results in global harmonization of the definition of Fibers/Flyings which is beneficial to all.

As Chair of EEC-AAA, member of CMP-14, Convenor of ISO/IEC 80079-20-2 and co-Convenor of IEC 60079-10-2,

Don Ankele

Related Item

• FR19, FR439, FR440

Submitter Information Verification

Submitter Full Name: Donald Ankele

Organization: UL LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 16:48:11 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-12-NFPA 660-2024](#)

Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.



Public Comment No. 226-NFPA 660-2024 [Section No. 3.3.45]

3.3.45* Fibers/Flyings.

Elongated particulate solids having one or more dimension greater than 500 µm. (CMD-FUN)

3.3.45.1

*

Combustible Fibers/Flyings.

Fibers/ flyings that present a flash fire or explosion hazard

when

where any dimension is greater than 500 µm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. (CMD-FUN) . [499, 2021]

3.3.45.2

*

Ignitable Fibers/Flyings.

Fibers/ flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. (CMD-FUN) . [499, 2021]

Delete *3.3.45.1 and *3.3.45.2

Statement of Problem and Substantiation for Public Comment

Standards Council Decision No. 18-4-26 directed the Technical Committees relating to combustible dusts, hazardous area classification, and electrical installations to form a task group to resolve conflicts in provisions relating to combustible metal dusts in codes, standards and recommended practices NFPA 70, NFPA 484, NFPA 499, NFPA 652 and NFPA 654. The task group was formed and met by webinar. The TG meetings were chaired by the chairman of the National Electrical Code Committee (NEC-AAC). Members of the TG included the Chairs of the Combustible Dust Correlating Committee (CMD-AAC), Committee on Fundamentals of Combustible Dusts (CMD-FUN), Committee on Combustible Metal Dusts (CMD-CMM), Committee on Electrical Equipment in Chemical Atmospheres (EEC-AAA), National Electrical Code Committee Code-Making Panel 14 (NEC-P14), as well as voting members of CMD-FUN, CMD-CMM, EEC-AAA and NEC-P14. EEC-AAA also provided cross-committee participants to the TG, as the Chair is a Principal member of NEC-P14, and three Principal members are also members of CMD-FUN and CMD-CMM. Meetings were facilitated by the NFPA Staff Liaison for EEC-AAA, and the staff liaison for CMD-AAC and NEC-P14 also participated in the discussions. This task group, termed the Joint Task Group following, developed the TIAs for NFPA 499, NEC, NFPA 484, NFPA 652 and NFPA 654 to address the issues. 1) It is recommended to delete the definition of Fibers/Flyings as proposed in FR-19. The very goal of the Joint Task Group was to coordinate combustible dust definitions to the maximum extent possible and facilitate proper installation of electrical equipment under the Division and Zone systems, removing the dust committees concerns with Zone system definitions. This was achieved with the TIA. While this definition of Fibers/Flyings does not detract from the proper understanding of either Combustible Fibers/Flyings or Ignitable Fibers/Flyings, the removal of the particle size from the two other definitions causes them to be different from those incorporated in the NEC. This is an arbitrary change which can only serve to confuse the users. 2) It is recommended to retain the original definition of Ignitable Fibers/Flyings as included in the TIA and delete FR 439. In FR 439, the committee changed the definition of Ignitable Fibers/Flyings from "Fibers/flyings ... which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard" to "Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce an ignitable layer fire hazard." The committee essentially replaces "not likely to be in suspension to produce an explosible mixture" with "do not present a flash fire or explosion hazard". Concerning the elimination of the phrase "explosible mixture", please see the comment on FR 440. The committee substantiation of this proposed change is, in part, "the phrase "not likely to be in suspension" is both subjective and not inherent to the properties of the material, meaning that a given form of material could be an ignitable fiber/flying in one location but a combustible fiber/flying in another." To this observation I say, but that is just the point. A material that is released initially as discrete combustible fibers/flyings can become unlikely to be suspended in air by agglomeration, intermingling on the retaining surface, action of humidity or adhesion of fiber finishes as are typically used in fiber-producing operations. Thus a material that is easy to suspend when released can quickly or over a longer period become "not likely to be in suspension". The subjective nature of this determination is certainly true, however, the implication that this is somehow related to the expert opinion on whether air currents or traffic patterns in a particular location are sufficient to determine electrical classification is not the case. In fact, looking at NFPA 499, it is clear that the depth of material alone is the criterion for establishing the Division or Zone classification. Likelihood of an external disturbance is not a factor. Ignitable Fiber/Flyings have been a part of the NEC for decades. The NEC has a long history of successfully using the phrase "not likely to be in suspension" to permit users to differentiate the need for Class II or Class III electrical installations. The Joint Task Group chose to retain this phrase, "not likely to be in suspension", when adding the new term Combustible Fibers/Flyings in order to coordinate with the dust committees' need to recognize non-spherical, larger dimensioned, explosible materials. This is due, in part, to Ignitable Fibers/Flyings having additional surface temperature limitations because they are less likely to be routinely displaced and replaced. Except for Combustible Metal Fibers/Flyings, the electrical installation requirements for Combustible Fibers/Flyings and Ignitable Fibers/Flyings are the same – other than surface temperature limitations. Retention of this phrase is very important. Replacing this phrase will only serve to confuse the users. 3) It is recommended to retain the original definition of Combustible Fibers/Flyings as included in the TIA and delete FR 440. In FR 440, the committee changed the definition of Combustible Fibers/Flyings from "Fibers/ flyings ... which can form an explosible mixture when suspended in air" to "Fibers/flyings ... that present a flash fire or explosion

hazard when suspended in air". While this change inserts a parallel language to the historical definition of combustible dust, the committee statement that this change "replaces the nebulous phrase "can form an explosible mixture"" is not consistent with the very ASTM test standard used to determine this characteristic of a material. ASTM E1226 is titled "Standard Test Method for Explosibility of Dust Clouds". The phrase "can form an explosible mixture" is extremely well-defined in the ASTM standard and other test methods. This very relationship between the test method and the material being tested is one of the reasons the Joint Task Group chose the language "explosible" as included in the prior TIA. The 660 committee also developed a definition for "explosible" in the First Revision. Again, this is not a nebulous term, rather a very specifically defined test result. It is apparent that this proposed change is an arbitrary choice of the committee and does not have a technical justification. The Joint Task Group worked to provide consistency between the NEC and the dust standards on concerns with electrical classification, particularly for non-spherical particulate with the addition of the two terms, Combustible Fibers/Flyings and Ignitable Fibers/Flyings. This proposed and arbitrary change will reduce that consistency and potentially cause confusion among the users.

Related Item

.

Submitter Information Verification

Submitter Full Name: David Wechsler

Organization: Consultant

Street Address:

City:

State:

Zip:

Submission Date: Wed Jan 03 19:40:36 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-12-NFPA 660-2024](#)

Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.

**Public Comment No. 227-NFPA 660-2024 [Section No. 3.3.45]****3.3.45* Fibers/Flyings.**

~~Elongated particulate solids having one or more dimension greater than 500 µm. (CMD-FUN)~~

3.3.45.1 * _ Combustible Fibers/Flyings.

Fibers/flyings

~~that present a flash fire or explosion hazard when~~

~~, where any dimension is greater than 500 um in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. (~~

~~CMD-FUN~~

~~499, 2024)~~

3.3.45.2 * _ Ignitable Fibers/Flyings.

Fibers/flyings

~~that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce an~~

~~, where any dimension is greater than 500 um in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. (~~

~~CMD-FUN~~

~~499, 2024)~~

Statement of Problem and Substantiation for Public Comment

Revert to the existing NFPA 499 and NFPA 70 definitions. To revise those definitions in NFPA 660, but require area classification and electrical installation in accordance with NFPA 499 and NFPA 70 creates a misalignment and plenty of room for confusion. This is not helping the end user. If the NFPA 660 definitions were to remain as proposed in the FR, NFPA 660 would then need to include separate requirements for area classification and electrical installations. That should REALLY create confusion.

Related Item

- First Revision No. 19

Submitter Information Verification

Submitter Full Name: William Lawrence

Organization:

Street Address:

City:

State:

Zip:

Submittal Date: Thu Jan 04 06:58:10 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-12-NFPA 660-2024

Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.

**Public Comment No. 228-NFPA 660-2024 [Section No. 3.3.45.1]****3.3.45.1* Combustible Fibers/Flyings.**

Fibers/flyings that present a flash fire or explosion hazard when , where any dimension is greater than 500 um in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. - (CMD-FUN)- 499, 2024)

3.3.45.2 ~~*Ignitable Fibers/Flyings:~~

Fibers/flyings that do not present a flash fire or explosion hazard in air at standard atmospheric pressure and temperature, but that can produce an , where any dimension is greater than 500 um in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard.

Statement of Problem and Substantiation for Public Comment

Revert to the existing NFPA 499 and NFPA 70 definitions. To revise those definitions in NFPA 660, but require area classification and electrical installation in accordance with NFPA 499 and NFPA 70 creates a misalignment and plenty of room for confusion. This is not helping the end user. If the NFPA 660 definitions were to remain as proposed in the FR, NFPA 660 would then need to include separate requirements for area classification and electrical installations. That should REALLY create confusion

Related Item

- First Revision #19

Submitter Information Verification

Submitter Full Name: Lowell Reith

Organization: Interstates Construction Servi

Street Address:

City:

State:

Zip:

Submittal Date: Thu Jan 04 08:25:50 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-12-NFPA 660-2024

Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.



Public Comment No. 233-NFPA 660-2024 [Section No. 3.3.47]

3.3.47 * – Fire Hazard.

Any situation, process, material, or condition that can cause a fire or provide a ready fuel supply to augment the spread or intensity of a fire and poses a threat to life or property. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This definition has been replaced by a new definition in 3.3.38.1

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	The PC provided a new definition.
<u>Related Item</u>	
• Modification to new section 3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 11:47:01 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 240-NFPA 660-2024 [Section No. 3.3.51]

3.3.51 * – Flash Fire.

A deflagration that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

The new 3.3.38 replaces this definition.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new 3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 11:59:55 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 38-NFPA 660-2023 [New Section after 3.3.66]****TITLE OF NEW CONTENT**

3.3.33.3* Ignitable Liquid.

Any liquid or liquid mixture that has a measurable closed-cup flash point.

A.3.3.33.3 Ignitable Liquid.

Unless otherwise specified, the term liquid means an ignitable liquid.

The term ignitable liquid refers to any liquid that has a measurable closed-cup flash point. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitable liquids.(See Annex B for more information.)

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._109.pdf	NFPA 660 CC Note No. 109	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 109 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-CMM: Extract the definition of ignitable liquid from NFPA 30 in Ch 3 to explain terminology

From NFPA 30:

3.3.33.3* Ignitable Liquid.

Any liquid or liquid mixture that has a measurable closed-cup flash point.

A.3.3.33.3 Ignitable Liquid.

Unless otherwise specified, the term liquid means an ignitable liquid.

The term ignitable liquid refers to any liquid that has a measurable closed-cup flash point. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitable liquids.(See Annex B for more information.)

Related Item

- CC Note 109

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:13:39 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-13-NFPA 660-2024

Statement: The definition of ignitable liquid is being extracted from NFPA 30 to explain terminology used in this standard.



Correlating Committee Note No. 109-NFPA 660-2023 [New Section after 3.3.66]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:36:36 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Consider the following note from CMD-CMM: Extract the definition of ignitable liquid from NFPA 30 in Ch 3 to explain terminology

From NFPA 30:

3.3.33.3* Ignitable Liquid.

Any liquid or liquid mixture that has a measurable closed-cup flash point.

A.3.3.33.3 Ignitable Liquid.

Unless otherwise specified, the term liquid means an ignitable liquid.

The term ignitable liquid refers to any liquid that has a measurable closed-cup flash point. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitable liquids.(See Annex B for more information.)

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.
Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 292-NFPA 660-2024 [New Section after 3.3.76]****TITLE OF NEW CONTENT**

Add a new definition for management of change and renumber subsequent definitions. Add related annex material. New content to state:

3.X* Management of Change (MOC)

A management system that requires the evaluation of proposed changes to process materials, staffing, job tasks, technology, equipment, procedures, and facilities to evaluate the potential safety significance of the change, identify any additional needed safety controls, and to identify changes to other management systems required to safely implement the change.

A.3.X See A.8.12.1.

Statement of Problem and Substantiation for Public Comment

In developing the revised content proposed by Public Comment 276, it was discovered that, while the term Management of Change is used in the standard, the term is not defined. It is believed that adding the definition is important to the user understanding and properly applying the revised text for 8.13 that was proposed in PC 276.

Related Item

- FR 92

Submitter Information Verification

Submitter Full Name: Walter Frank

Organization: Frank Risk Solutions, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Thu Jan 04 16:04:15 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-14-NFPA 660-2024

Statement: Adding this definition is important to the user understanding and properly applying the requirements in 8.12.

**Public Comment No. 298-NFPA 660-2024 [New Section after 3.3.90]****TITLE OF NEW CONTENT**

Add a new definition of Operational Readiness Review, as follows:

3.Z Operational Readiness Review

A management system to verify that all required conditions exist and required safety tasks have been completed so that new, modified, or formerly idled facilities can be safely started up.

Statement of Problem and Substantiation for Public Comment

A definition of Operational Readiness Review is needed in conjunction with the changes to 8.13 proposed in Public Comment 276.

Related Item

- FR 92

Submitter Information Verification

Submitter Full Name: Walter Frank

Organization: Frank Risk Solutions, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Thu Jan 04 16:13:43 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-42-NFPA 660-2024

Statement: A definition of Operational Readiness Review is needed in conjunction with the changes to 8.13.

**Public Comment No. 113-NFPA 660-2023 [Section No. 3.3.97]**

3.3.97 – Portable Air Material Separator (AMS) (Dust Collector):

~~A portable machine designed to collect airborne dust produced from a dust-generating operation. (CMD-FUN)~~

Statement of Problem and Substantiation for Public Comment

3.3.97 Portable Air Material Separator (AMS) has been moved to 3.3.5.12 per recommendation from TG

Related Item

- FD report

Submitter Information Verification

Submitter Full Name: Niels Pedersen

Organization: Nederman LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 20 14:37:57 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-86-NFPA 660-2024](#)

Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.

**Public Comment No. 114-NFPA 660-2023 [Section No. 3.3.98]****3.3.98 – Portable Vacuum Cleaner.**

~~A movable assembly consisting of a vacuum source (AMD), an AMS using either liquid or filter media within an enclosure, and a vacuum hose, used to remove dusts and particles from surfaces. (CMD-FUN)~~

Statement of Problem and Substantiation for Public Comment

3.3.98 Portable Vacuum Cleaners has been moved to 3.3.5.13 per recommendation by TG

Related Item

- FD report

Submitter Information Verification

Submitter Full Name: Niels Pedersen

Organization: Nederman LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 20 15:04:21 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-86-NFPA 660-2024](#)

Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.

**Public Comment No. 120-NFPA 660-2023 [Section No. 3.3.137]****3.3.137 – Wet Air-Material Separator.**

~~An air-material separator (AMS) that uses liquid for the separation of the pneumatically conveyed solid from the air/gas. (CMD-FUN)~~

Statement of Problem and Substantiation for Public Comment

3.3.137 Wet Air-Material Separator has been moved to 3.3.5.13 per recommendation by TG

Related Item

- FD report

Submitter Information Verification

Submitter Full Name: Niels Pedersen

Organization: Nederman LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 27 12:18:32 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-86-NFPA 660-2024](#)

Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.

**Public Comment No. 39-NFPA 660-2023 [Section No. 4.2.4]****4.2.4 Compliance Options.**

The objectives in Section 4.2 shall be deemed to have been met by implementing both of the following:

- (1) The prescriptive requirements in Chapters 5, 7, and 8
- (2)* A hazard management program in conformance with the prescriptive requirements of Chapter 9 or that meets the objectives of a Chapter 9 requirement through a performance-based design in accordance with Chapter 6

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._51.pdf	NFPA 660 CC Note No. 51	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 51 appeared in the First Draft Report on First Revisions No. 182 in NFPA 660.

It was pointed out during the balloting that 4.2.4, as revised, makes no reference to the hazard management program requirements in the industry or commodity-specific chapters.

1. Revise 4.2.4.(2) to say "A hazard management program in conformance with the prescriptive requirements of Chapter 9 and the prescriptive hazard management requirements of the relevant industry or commodity-specific chapter, or that meets the objectives of Chapter 4 and the relevant industry or commodity-specific chapter through a performance-based design in accordance with Chapter 6."

2. Add the following to the annex material for 4.2.4.(2): "Refer to Chapters 11, 12, 13, 14, and 15 for the prescriptive hazard management requirements in the relevant industry or commodity-specific chapters."

Related Item

- FR No 182

Submitter Information Verification**Submitter Full Name:**

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:19:24 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-85-NFPA 660-2024

Statement: This section previously did not make reference to the hazard management program requirements in the industry or commodity-specific chapters.



Correlating Committee Note No. 51-NFPA 660-2023 [Section No. 4.2.4]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 07:28:13 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: It was pointed out during the balloting that 4.2.4, as revised, makes no reference to the hazard management program requirements in the industry or commodity-specific chapters.

1. Revise 4.2.4.(2) to say "A hazard management program in conformance with the prescriptive requirements of Chapter 9 and the prescriptive hazard management requirements of the relevant industry or commodity-specific chapter, or that meets the objectives of Chapter 4 and the relevant industry or commodity-specific chapter through a performance-based design in accordance with Chapter 6."

2. Add the following to the annex material for 4.2.4.(2): "Refer to Chapters 11, 12, 13, 14, and 15 for the prescriptive hazard management requirements in the relevant industry or commodity-specific chapters."

FR-182-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 7-NFPA 660-2023 [Section No. 4.2.4]****4.2.4 Compliance Options.**

The objectives in Section 4.2 shall be deemed to have been met by implementing both of the following:

- (1) The prescriptive requirements in Chapters 5, 7, and 8
- (2) * A hazard management program in conformance with the prescriptive requirements of Chapter 9 and the applicable Industry Specific Chapter or that meets the objectives of a Chapter 9 requirement through a performance-based design in accordance with Chapter 6

Statement of Problem and Substantiation for Public Comment

The original text did not reference being in compliance with the industry specific chapters

Related Item

- FR182

Submitter Information Verification

Submitter Full Name: Craig Froehling

Organization: Cargill, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 06 13:15:20 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-85-NFPA 660-2024

Statement: This section previously did not make reference to the hazard management program requirements in the industry or commodity-specific chapters.

**Public Comment No. 40-NFPA 660-2023 [New Section after 4.2.5]****TITLE OF NEW CONTENT**13.4.2.5 Structural Integrity.

The facility shall be designed, constructed, and equipped to maintain its structural integrity in spite of the effects of fire or explosion for the time necessary to evacuate, relocate, or defend in place occupants not in the immediate proximity of the ignition.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._100.pdf	NFPA 660 CC Note No. 100	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 100 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-HAP: Recommend that fundamentals adopt 13.4.2.5 Structural Integrity (which will be 15.4.2.5 after Chapter renumbering) as a subsection of 4.2:

13.4.2.5 Structural Integrity.

The facility shall be designed, constructed, and equipped to maintain its structural integrity in spite of the effects of fire or explosion for the time necessary to evacuate, relocate, or defend in place occupants not in the immediate proximity of the ignition.

Related Item

- CC Note 100

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:22:52 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-16-NFPA 660-2024

Statement: This incorporates language from Chapter 15 to include explosions as it has been deemed fundamental.



Correlating Committee Note No. 100-NFPA 660-2023 [New Section after 4.2.5]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 15:55:32 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Consider the following note from CMD-HAP: Recommend that fundamentals adopt 13.4.2.5 Structural Integrity (which will be 15.4.2.5 after Chapter renumbering) as a subsection of 4.2:

13.4.2.5 Structural Integrity.

The facility shall be designed, constructed, and equipped to maintain its structural integrity in spite of the effects of fire or explosion for the time necessary to evacuate, relocate, or defend in place occupants not in the immediate proximity of the ignition.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

13 Affirmative All

1 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Negative with Comment

Bujewski, Matthew J.

This may not be possible in all instances and should not be a fundamental requirement.



Public Comment No. 250-NFPA 660-2024 [Section No. 4.2.5]

4.2.5

Where a dust or particulate solid fire, local area flash fire, or ~~explosion hazard~~ equipment explosion hazard exists within a process system, the hazards shall be managed in accordance with this standard.

Statement of Problem and Substantiation for Public Comment

This is tied to the new definitions provided in 3.3.38.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new 4.2.5	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 14:30:28 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 41-NFPA 660-2023 [Section No. 4.2.5]****4.2.5**

Where a dust or particulate solid fire, flash fire, or explosion hazard exists within a process system, the hazards shall be managed in accordance with this standard.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._54.pdf	NFPA 660 CC Note No. 54	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 54 appeared in the First Draft Report in NFPA 660.

Chapter 14 (which will be Chapter 13 after Chapter renumbering) addresses liquid sulfur and sulfur vapor and Chapter 15 (which will be 14 after Chapter renumbering) addresses thermal oil heating systems. So, the fire and explosion hazards encompassed by the standard are not limited to combustible dusts and particulate solids. There may be fire and explosion hazards in Chapter 12 that are not directly related to the combustion of particulate solids.

Related Item

- CC Note 54

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:36:10 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-17-NFPA 660-2024](#)

Statement: This addresses the hazards covered by other chapters, such as liquid sulfur, sulfur vapor, thermal oil heating systems, and molten metals.



Correlating Committee Note No. 54-NFPA 660-2023 [Sections 4.2.5, 4.2.6]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 07:42:15 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Chapter 14 (which will be Chapter 13 after Chapter renumbering) addresses liquid sulfur and sulfur vapor and Chapter 15 (which will be 14 after Chapter renumbering) addresses thermal oil heating systems. So, the fire and explosion hazards encompassed by the standard are not limited to combustible dusts and particulate solids. There may be fire and explosion hazards in Chapter 12 that are not directly related to the combustion of particulate solids.

Ballot Results

✓ This item has passed ballot

18 Eligible Voters

3 Not Returned

13 Affirmative All

1 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

Negative with Comment

Bujewski, Matthew J.

This is the problem with writing just a combustible dust standard. The industry specific standards covered fire and dust which may include other hazards besides combustible dust. Where is the industry going to find guidance on specific equipment and processes for its industry if it is not in the industry specific chapter?



Public Comment No. 251-NFPA 660-2024 [Section No. 4.2.6]

4.2.6

Where a dust or particulate solid fire, building compartment flash fire, or building explosion hazard exists within a building or building compartment, the effects of the fire, building compartment flash fire, or building explosion shall be managed in accordance with this standard.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions provided in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to the new 4.2.6	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 14:35:30 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 132-NFPA 660-2023 [Chapter 5]

Chapter 5 Hazard Identification

5.1* Responsibility.

The owner/operator of a facility with potentially combustible dusts shall be responsible for determining whether the materials are combustible or explosive.

5.1.1

Where dusts are determined to be combustible or explosive, the hazards associated with the dusts shall be assessed in accordance with Chapter 7.

5.1.2

Where dusts are determined to be combustible or explosive, controls to address the hazards associated with the dusts shall be identified and implemented in accordance with 4.2.4.

5.2 Noncombustible materials

5.2.1 A material that has been tested to ASTM E136 and has passed the test shall be considered a noncombustible material.

5.2.2 A material that, in the form in which it is used and under the conditions anticipated, will not ignite, support combustion, burn, or release flammable vapors when subjected to fire or heat shall be considered a noncombustible material.

5.2.3 A material that has been determined to present no fire hazard potential, in terms of fire, flash fire or explosibility, shall be permitted to be used in the same manner as a noncombustible material.

5.3 Screening for Combustibility- or , Fire Hazard Potential or Explosibility.

5.2.3.1*

Where the owner or operator does not have prior knowledge of combustibility- ~~or , fire hazard potential or~~ explosibility, the analysis of representative samples in accordance with the requirements of 5.4.2 or of 5.5.1 and 5.4.5.3 shall be conducted to determine if the material is ~~in a combustible or explosive , presents fire hazard potential or is in an explosive~~ form.

5.2.3.2*

The determination of combustibility- ~~or , fire hazard potential or~~ explosibility shall be permitted to be based upon historical facility data or published data that are deemed to be representative of current materials and process conditions.

5.2.3.3*

Test results, historical data, and published data shall be documented and, when requested, provided to the authority having jurisdiction (AHJ).

5.2.3.4*

The absence of previous incidents shall not be used as the basis for deeming a particulate to not be combustible or explosive.

5.2.3.5

Where dusts are determined to not be combustible- ~~or explosive , not to exhibit fire hazard potential or not be explosive~~ , the owner/operator shall maintain documentation to demonstrate that the dusts ~~are not combustible or explosive present no fire hazard potential or are not explosive~~ .

5.3.4* Self-Heating and Reactivity Hazards. (Reserved)

5.4 Combustibility and 5 Fire hazard potential and Explosibility Tests.

Where ~~combustibility or~~ fire hazard potential or explosibility screening tests are required, they shall be conducted on representative samples obtained in accordance with Section 5.5.

5.4.5.1 Determination of ~~Combustibility~~ (Fire Hazard Potential) .

5.4.5.1.1

Where the ~~combustibility is~~ fire hazard potential is not known, determination of fire hazards of a layer of material shall be determined by one of the following tests:

- (1) * A test based on the *UN Recommendations on the Transport of Dangerous Goods: Model Regulations — Manual of Tests and Criteria*, Part III, Subsection 33.2.1, Test N.1, "Test Method for Readily Combustible Solids," Section 33.2.4.3.1.
- (2) * Other fire/combustibility test methods that provide an equivalent result for a powder layer acceptable to the authority having jurisdiction

5.4.5.1.2*

For the purposes of determining ~~combustibility~~ fire hazard potential , if the dust in the form tested ignites and propagates combustion or ejects sparks from the heated zone after the heat source is removed, the material shall be considered combustible.

5.4.5.1.3

If the dust is known to be explosible, it shall be permitted to assume that the dust is combustible, and the requirements of 5.4.5.1.1 shall not apply.

5.4.5.2* Determination of Flash Fire Potential. (Reserved)**5.4.5.3** Determination of Explosibility.**5.4.5.3.1**

Where the explosibility is not known, determination of explosibility of dusts shall be determined according to one of the following tests:

- (1) The "Go/No-Go" screening test methodology described in ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*
- (2) ASTM E1515, *Standard Test Method for Minimum Explosible Concentration of Combustible Dusts*
- (3) An equivalent test methodology

5.4.5.3.2*

When determining explosibility, it shall be permitted to test a sample sieved to less than 200 mesh (75 μm).

5.4.5.3.3*

When determining explosibility, it shall be permitted to test the as-received sample.

5.4.5.3.4

It shall be permitted to assume a material is explosible, forgoing the requirements of 5.4.453.3.1.

5.4.5.3.5*

When the representative sample has a characteristic particle size smaller than 0.5 μm , the explosibility screening test method shall account for possible ignitions in the sample injection apparatus.

5.4.5.4 Quantification of ~~Combustibility and~~ Fire Hazard Potential and Explosibility Characteristics.**5.4.5.4.1***

Where dusts are determined to be combustible, exhibit fire hazard potential or ~~explosible~~ be explosible, additional testing shall be performed, as required, to acquire the data necessary to support the performance-based design method described in Chapter 6, the DHA described in Chapter 7, the risk assessments described in Chapter 9, or specification of the hazard mitigation and prevention described in Chapter 9.

5.4.5.4.2

The owner/operator shall be permitted to use the worst-case characteristics of the various materials being handled as a basis for design.

5.4.5.4.3

When quantifying combustibility, fire hazard potential and explosibility characteristics, it shall be permitted to test the as-received sample only for those locations where the particulate remains homogeneously mixed. (See A.5.4.5.3.3.)

5.4.5.4.4*

Where the material does not remain homogeneously mixed, a representative fine fraction shall be tested.

5.5.6 Sampling.**5.5.6.1** Sampling Plan.**5.5.6.1.1**

A sampling plan shall be developed to provide data as needed to comply with the requirements of this chapter.

5.5.6.1.2

Representative samples of dusts shall be identified and collected for testing according to the sampling plan.

5.5.6.1.3

The sampling plan shall include the following:

- (1) Identification of locations where fine particulates and dust are present
- (2) Identification of representative samples
- (3) Collection of representative samples
- (4) * Preservation of sample integrity
- (5) Communication with the test laboratory regarding sample handling
- (6) Documentation of samples taken
- (7) Safe sample collection practices

5.5.6.2* Mixtures.

If the combustible particulate solid sample is a mixture, the approximate proportions of each general category of particulate solid shall be determined and documented on the basis of available information and shall be used to assist in determining representative samples.

5.5.6.2.1

Mixtures with a metallic particulate component and not excluded by the criteria of 12.1.1.6.2 shall be treated as a metallic combustible dust in accordance with the relevant sections of Chapter 12.

5.5.6.2.2

Mixtures consisting of more than 50 percent by mass wood or wood-based particulate with a metallic particulate component and excluded by the criteria of 12.1.1.6.2 shall be treated as a wood dust in accordance with the relevant sections of Chapter 14.

5.5.6.2.3

Mixtures consisting of more than 50 percent by mass agricultural particulate to be used in foodstuffs with a metallic particulate component and excluded by the criteria of 12.1.1.6.2 shall be treated as an agricultural dust in accordance with the relevant sections of Chapter 11.

5.5.6.2.4

Any mixture that does not fall under 5.5.2.1 through 5.5.2.3 shall be treated as a chemical dust in accordance with Chapter 15.

5.5.6.2.5

Where the mixture contains both combustible and noncombustible materials, the combustible components shall be used as the basis for the mixture classification.

5.5.6.2.6*

Where components with different chemical compositions do not remain homogeneously mixed, the properties of the individual constituents shall be considered separately.

5.5.6.3* Representative Samples.**5.5.6.3.1**

Samples collected from each location shall be representative of material used in the process or equipment or found on surfaces at that location.

5.5.6.4 Sample Collection.

Dust samples shall be collected in a safe manner without introducing an ignition source, dispersing dust, or creating or increasing the risk of injury to workers.

5.5.6.4.1*

Samples shall be uniquely identified .

Statement of Problem and Substantiation for Public Comment

The issue of combustibility should be described and assessed in this section. It appears, from the remainder of the standard, that there are 3 types of materials that are of interest in this standard: noncombustible materials (which could be those that "pass" ASTM E136 or those that are determined to be totally inert when exposed to heat or flame), materials that present no fire hazard potential, and material that are not explosible. I suspect that my proposed revisions will not be exactly what the committee wants but the committee needs to ensure that it does not use the term "noncombustible" in ways that are not consistent with the way it is used elsewhere. The committee should also consider the way other NFPA documents provide definitions that do not contain requirements. I understand the concern of the committee that combustible or explosible dusts are a different type of material than building materials but terminology needs to be understood outside of the area of committee members only.

Related Item

- pi 230

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

Street Address:

City:

State:

Zip:

Submission Date: Wed Dec 27 17:29:11 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The requirements in Chapter 5 relate to the evaluation of the process material, and not materials of construction, which ASTM E136 covers. The committee agrees with the statement made at the First Draft that the term noncombustible is used throughout this standard primarily as it applies to process materials, and not building materials, so these

requirements are not relevant here, and the definition in Chapter 3 adequately addresses the use of the term "noncombustible material" in this standard. Changing the terminology "fire hazard potential" throughout Chapter 5 introduces a new use of the term that has not had public review and should not be done at this stage in the process.



Public Comment No. 42-NFPA 660-2023 [Section No. 6.1.2]

6.1.2

It shall be permitted to use performance-based alternative designs for a process or part of a process, specific material, or piece of equipment in lieu of the prescriptive requirements found in Chapter 9 – ~~[See A.4.2.4(2)]~~ and the prescriptive requirements of the relevant industry or commodity-specific chapter.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._52.pdf	NFPA 660 CC Note No. 52	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 52 appeared in the First Draft Report on First Revisions No.182 in NFPA 660.

It was pointed out during the balloting that 4.2.4, as revised, makes no reference to the hazard management program requirements in the industry or commodity-specific chapters. The same problem is contained in 6.1.2.

Revise 6.1.2 to end "... in lieu of the prescriptive requirements found in Chapter 9 and the prescriptive requirements of the relevant industry or commodity-specific chapter."

Related Item

- FR No. 182

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:39:10 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-18-NFPA 660-2024](#)

Statement: Similar to the change made in 4.2.4, this revision has been made because the section did not reference the hazard management program requirements in the industry or commodity-specific chapters.



Correlating Committee Note No. 52-NFPA 660-2023 [Section No. 6.1.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 07:31:24 EDT 2023

Committee Statement

Committee Statement: It was pointed out during the balloting that 4.2.4, as revised, makes no reference to the hazard management program requirements in the industry or commodity-specific chapters. The same problem is contained in 6.1.2.

Revise 6.1.2 to end "... in lieu of the prescriptive requirements found in Chapter 9 and the prescriptive requirements of the relevant industry or commodity-specific chapter."

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 252-NFPA 660-2024 [Section No. 6.3.1]

6.3.1* Life Safety.

The life safety objectives of 4.2.1 with respect to a fire, flash fire (local area/building compartment) , or explosion (building/equipment) hazard shall be achieved if either of the following conditions is met:

- (1) Ignition has been prevented.
- (2) Under all fire, flash fire, or explosion scenarios, no person, other than those in the immediate proximity of the ignition, is exposed to untenable conditions due to the fire, flash fire, or explosion; and for fire or explosion scenarios, no critical structural element of the building is damaged to the extent that it can no longer support its design load during the time necessary to effect complete evacuation.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new 6.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 14:40:45 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 43-NFPA 660-2023 [Section No. 6.3.4]****6.3.4 Mitigation- Mitigation of Fire Spread - of Fires, Flash Fires, and Explosions: Explosions, or Releases of Hazardous Materials**

When limitation of fire, flash fire, and explosion spread is to be achieved, all of the following criteria shall be demonstrated:

- (1) Adjacent combustibles shall not attain their ignition temperature.
- (2) Building design and housekeeping shall prevent combustibles from accumulating exterior to the enclosed process system to a concentration that is capable of supporting propagation.
- (3) Particulate processing systems shall prevent fire, flash fire, or explosion from propagating from one process system to an adjacent process system or to the building interior.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._29.pdf	NFPA 660 CC Note No. 29	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 29 appeared in the First Draft Report on First Revisions No. 48 in NFPA 660.

Should the title of 6.3.4 be revised to match 4.2.3 (revised by FR 48)? The other titles in 6.3 match the objectives in 4.2.

4.2.3* Mitigation of Fire Spread, Explosions, or Releases of Hazardous Materials.

6.3.4 Mitigation of Spread of Fires, Flash Fires, and Explosions.

Related Item

- FR No. 48

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:43:45 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-19-NFPA 660-2024](#)

Statement: The title of 6.3.4 is being revised to match 4.2.3 as revised at the First Draft stage. The other titles in 6.3 match the objectives in 4.2.



Correlating Committee Note No. 29-NFPA 660-2023 [Section No. 6.3.4]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 14:28:57 EDT 2023

Committee Statement

Committee Statement: Should the title of 6.3.4 be revised to match 4.2.3 (revised by FR 48)? The other titles in 6.3 match the objectives in 4.2.

4.2.3* Mitigation of Fire Spread, Explosions, or Releases of Hazardous Materials.

6.3.4 Mitigation of Spread of Fires, Flash Fires, and Explosions.

Ballot Results

✔ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 216-NFPA 660-2024 [Section No. 7.1]****7.1* General Requirements.**

A. 7.1 Add "[See CCPS "Guidelines for Combustible Dust Hazard Analysis" for additional guidance on analyzing combustible dust hazards](#) ." to the end of the existing annex material.

7.1.1 Retroactivity.**7.1.1.1**

The requirements of this chapter shall be applied retroactively.

7.1.1.2*

A DHA shall be completed for all new and existing processes and facility compartments.

7.1.2

The owner/operator of a facility where materials determined to be combustible or explosible in accordance with Chapter 5 are present in an enclosure shall be responsible to ensure a DHA is completed in accordance with the requirements of this chapter.

7.1.3

The absence of previous incidents shall not be used as the basis for not performing a DHA.

7.1.4

The DHA shall be reviewed and updated at least every 5 years.

Statement of Problem and Substantiation for Public Comment

Analyzing the hazards associated with combustible dust processes is a complicated topic requiring implementation guidance. The existing annex language provides an excellent base level of information but is an inappropriate vehicle for the breadth of information necessary to ensure effective hazard analysis. The CCPS publication listed is an excellent voluntary resource for the user community in search of further guidance.

The CSB's investigation of the 2017 Didion Milling Company Explosion and Fire revealed that the company had not conducted a DHA of their facility prior to the incident. Even if they had, they could have done so in compliance with the requirements of the standard (NFPA 61) and still missed the hazardous conditions responsible for causing the incident. This is due to the limited scope of equipment in existing facilities covered by NFPA 61's DHA requirements. It is imperative that users of the standard have reliable sources of guidance in implementing the requirements of NFPA 660. The CSB made the following recommendation to the NFPA as a result of this investigation:

Update NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, or a successor standard, to incorporate, at a minimum, the following elements:

1. Unify the requirements for performing dust hazard analyses to remove equipment exemptions and require the assessment of all processes, such as cyclones, as required in:
 - a. The 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust
 - b. Chapters 3, 5, and 6 of the CCPS's Guidelines for Combustible Dust Hazard Analysis.
2. Incorporate the additional guidance for Management of Change to include but not limited to:
 - a. Harmonize the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, requirements for section 8.12.2.4, modifications to operating and maintenance procedures, and section 8.12.2.4, employee training requirements.
 - b. Chapter 3 and Appendix B of the CCPS's Guidelines for the Management of Change for Process Safety, such as addressing temporary changes, operating and maintenance procedures, employee training, and dust testing results, to standardize MOC requirements across all industries that handle combustible dust.
3. Update the requirements for incident investigation management systems, to include but not limited to:
 - a. Incorporate the optional guidance of the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, as a mandatory requirement.
 - b. Chapters 4 and 10 of CCPS's Guidelines for Investigating Process Safety Incidents (3rd Edition).

Adopting this language would address subparagraph 1. Item b. of this recommendation.

Related Item

- PI 255, FR 38, FR 59, FR 60

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:54:45 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-20-NFPA 660-2024](#)

Statement: Analyzing the hazards associated with combustible dust processes is a complicated topic requiring implementation guidance. The existing annex language provides an excellent base level of information but does not cover the breadth of information necessary to ensure effective hazard analysis. The CCPS publication listed is an excellent voluntary resource for the user community in search of further guidance.



Public Comment No. 253-NFPA 660-2024 [Section No. 7.2.1]

7.2.1* Overview.

The DHA shall evaluate the fire, flash fire (local area/building compartment) , and explosion (building/equipment) hazards and provide recommendations to manage the hazards in accordance with Section 4.2.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new Section 7.2.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
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Zip:
Submittal Date: Thu Jan 04 14:45:05 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 256-NFPA 660-2024 [Section No. 7.2.2]

7.2.2* Qualifications.

The DHA shall be performed or led by a qualified person who possesses documented experience and education regarding methods for performing a DHA and the assessment and identification of mitigation or elimination options for the fire, flash fire ([local/building compartment](#)) , explosion ([building/equipment](#)) , and related hazards of the specific type or types of combustible dusts involved in the facility.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions provided in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 7.2.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
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Zip:
Submittal Date: Thu Jan 04 14:54:03 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 44-NFPA 660-2023 [Section No. 7.2.3]****7.2.3* Documentation.**

The results of the DHA review shall be documented, including any necessary action items requiring change to the process materials, process operations, equipment, safety systems, or facilities associated with the process.

The results of the hazard analysis shall be maintained for the life of the process.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._58.pdf	NFPA 660 CC Note No. 58	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No.58 appeared in the First Draft Report on First Revisions No. 59 in NFPA 660.

Add the following language from 12.7.2.3 to Ch 7:

12.7.2.3 Documentation.

The results of the hazard analysis shall be maintained for the life of the process.

Then 12.7.2.3 and 15.7.1.3 (which will be 14.7.1.3 after Chapter renumbering) could be deleted.

Related Item

- FR No.59

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:50:44 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-21-NFPA 660-2024

Statement: The text added as 7.2.3.2 was previously included in an industry-specific chapter and has been deemed fundamental.

The text previously under 7.2.3 was moved to a new 7.2.3.1 subsection.



Correlating Committee Note No. 58-NFPA 660-2023 [Section No. 7.2.3]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 09:16:26 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Add the following language from 12.7.2.3 to Ch 7:

12.7.2.3 Documentation.

The results of the hazard analysis shall be maintained for the life of the process.

Then 12.7.2.3 and 15.7.1.3 (which will be 14.7.1.3 after Chapter renumbering) could be deleted.

FR-59-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 257-NFPA 660-2024 [Section No. 7.3.1]

7.3.1 General.

The DHA shall include the following:

- (1) Identification and evaluation of the process or facility areas where fire, flash fire (local/building compartment) , and explosion (building/equipment) hazards exist
- (2) Where such a hazard exists, identification and evaluation of specific fire, flash fire, and explosion scenarios shall include the following:
 - (3) Identification of safe operating ranges
 - (4)* Identification of the safeguards that are in place to manage fire, flash fire, and explosion events
 - (5) Recommendation of additional safeguards where warranted, including a plan for implementation

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions provided in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification of new Section 7.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 14:55:49 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 258-NFPA 660-2024 [Section No. 7.3.3.3]

7.3.3.3*

Each part of the process that could potentially contain all of the following conditions shall be considered a ~~dust~~ local area flash fire or an equipment explosion hazard and shall be documented as such:

- (1) A combustible particulate solid of sufficiently small particle size and sufficient quantity
- (2) Air or other oxidizing atmosphere
- (3) A competent ignition source
- (4) A credible suspension mechanism

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 7.3.3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 14:58:23 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 259-NFPA 660-2024 [Section No. 7.3.4.2.1]

7.3.4.2.1*

The evaluation of ~~the dust~~ a building compartment flash fire or building explosion hazard ~~in~~ within a building or building compartment shall include a comparison of actual or intended dust accumulation to the threshold housekeeping dust accumulation limit that would present a potential for flash fire exposure to personnel or compartment failure due to explosive overpressure.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions provided in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new Section 7.3.4.2.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:03:22 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 139-NFPA 660-2024 [Section No. 8.1]****8.1 Retroactivity.**

This chapter shall be applied retroactively to new and existing facilities and processes where the DHA has determined that a combustible dust or particulate solid fire, flash fire, or explosion hazard exists .

A.8.1

The DHA will determine where fire, flash fire, or explosion hazards exist in process equipment or in building compartments. However, such hazards may not exist uniformly throughout a facility. Certain requirements in this chapter would not be mandatory for equipment or building compartments where the DHA has determined that a fire, flash fire, or explosion hazard does not exist. However, consideration should be given to generally applying a particular requirement when a fire, flash fire, or explosion hazard exists in at least a portion of the facility. For example, operating procedures would be required for equipment where a fire, flash fire, or explosion hazards exist. Rather than seeking to discriminate between those items of equipment that do, or do not, require operating procedures, the owner/ operator might find it more effective to provide operating procedures for all process equipment.

Statement of Problem and Substantiation for Public Comment

Chapter 8 does not apply unless the DHA has identified that a fire, flash fire, or explosion hazard exists. There is no need to emphasize that point for any one particular requirement. However, to reinforce where Chapter 8 applies, Section 8.1 a "DHA phrase" should be added to clarify the role of the DHA and subsequent application of the Chapter 8 requirements.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:06:32 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-22-NFPA 660-2024

Statement: Chapter 8 does not apply unless the DHA has identified that a fire, flash fire, or explosion hazard exists. There is no need to emphasize that point for any one particular requirement. However, to reinforce where Chapter 8 applies, Section 8.1 a "DHA phrase" has been added to clarify the role of the DHA and subsequent application of the Chapter 8 requirements.

**Public Comment No. 45-NFPA 660-2023 [Section No. 8.3]****8.3* Operating Procedures and Practices.****8.3.1***

Where the DHA identifies a combustible dust or particulate solid fire, flash fire, or explosion hazard, the owner/operator shall establish written procedures for operating its facility and equipment to prevent or mitigate fires, flash fires, and explosions from combustible particulate solids.

8.3.2 Portable Appliances.**8.3.2.1***

A written policy shall be established to regulate the use of portable appliances.

8.3.2.2*

The policy shall identify locations where specific portable appliances are permitted or prohibited.

8.3.3*

The owner/operator shall establish safe work practices to address hazards associated with maintenance and servicing operations.

8.3.3.1

The safe work practices shall apply to employees and contractors.

8.3.4*

A periodic walk-through of operating areas shall be conducted, on a schedule established by the owner/operator, to verify that operating procedures and safe work practices are being followed.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._13.pdf	NFPA 660 CC Note No. 13	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 13 appeared in the First Draft Report on First Revisions No. 63, 64 and 207 in NFPA 660

Consider the following note from CMD-HAP: Add text remaining in 13.8.3 (which will be 15.8.3 after Chapter renumbering) to Fundamentals Ch 8:

Operating and maintenance procedures shall address personal protective equipment (PPE), including flame-resistant garments, in accordance with the workplace hazard assessment required by NFPA 2113.

Annex:

Where a dust explosion hazard or dust flash-fire hazard exists, flame-resistant garments provide a measure of protection for exposed personnel.

Related Item

• FR No. 63, 64, 207

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 10:56:12 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-23-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 13-NFPA 660-2023 [Section No. 8.3]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 10:57:22 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add text remaining in 13.8.3 (which will be 15.8.3 after Chapter renumbering) to Fundamentals Ch 8:

Operating and maintenance procedures shall address personal protective equipment (PPE), including flame-resistant garments, in accordance with the workplace hazard assessment required by NFPA 2113.

Annex:

Where a dust explosion hazard or dust flash-fire hazard exists, flame-resistant garments provide a measure of protection for exposed personnel.

[FR-63-NFPA 660-2023](#)

[FR-64-NFPA 660-2023](#)

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

12 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

1 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Cholin, John M.

This should also refer the user to Section 8.6.1

Abstention

Bujewski, Matthew J.

I am not familiar enough with NFPA 2113 to decide if it should apply to all industries covered under NFPA 660.

**Public Comment No. 46-NFPA 660-2023 [Section No. 8.3]****8.3* Operating Procedures and Practices.****8.3.1***

Where the DHA identifies a combustible dust or particulate solid fire, flash fire, or explosion hazard, the owner/operator shall establish written procedures for operating its facility and equipment to prevent or mitigate fires, flash fires, and explosions from combustible particulate solids.

8.3.2 Portable Appliances.**8.3.2.1***

A written policy shall be established to regulate the use of portable appliances.

8.3.2.2*

The policy shall identify locations where specific portable appliances are permitted or prohibited.

8.3.3*

The owner/operator shall establish safe work practices to address hazards associated with maintenance and servicing operations.

8.3.3.1

The safe work practices shall apply to employees and contractors.

8.3.4*

A periodic walk-through of operating areas shall be conducted, on a schedule established by the owner/operator, to verify that operating procedures and safe work practices are being followed.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._74.pdf	NFPA 660 CC Note No. 74	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 74 appeared in the First Draft Report on First Revisions No. 63 and 64 in NFPA 660

Add a requirement to Section 8.3 to require annual review of operating procedures (or another determined frequency).

Related Item

- FR No 63, 64

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 11:01:13 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-24-NFPA 660-2024

Statement: Review of operating procedures has been added at a time frame that is consistent with OSHA requirements.



Correlating Committee Note No. 74-NFPA 660-2023 [Section No. 8.3]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 12:01:59 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Add a requirement to Section 8.3 to require annual review of operating procedures (or another determined frequency).

[FR-63-NFPA 660-2023](#)

[FR-64-NFPA 660-2023](#)

Ballot Results

✓ This item has passed ballot

18 Eligible Voters

3 Not Returned

13 Affirmative All

1 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

Negative with Comment

Bujewski, Matthew J.
This is burdensome and not necessary for all processes.

**Public Comment No. 47-NFPA 660-2023 [New Section after 8.3.1]****TITLE OF NEW CONTENT**

15.8.3 Operating Procedures and Practices.

Operating and maintenance procedures shall address personal protective equipment (PPE), including flame-resistant garments, in accordance with the workplace hazard

assessment required by NFPA 2113 and Section 8.6.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._103.pdf	NFPA 660 CC Note No. 103	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 103 appeared in the First Draft Report on First Revisions No. 290 in NFPA 660.

Consider the following note from CMD-WOO: Consider language from 15.8.3 (which will be 14.8.3 after Chapter renumbering) to section 8.3 as fundamental.

15.8.3 Operating Procedures and Practices.

Operating and maintenance procedures shall address personal protective equipment (PPE), including flame-resistant garments, in accordance with the workplace hazard assessment required by NFPA 2113 and Section 8.6.

Related Item

- FR No 290

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 11:24:08 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-23-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 103-NFPA 660-2023 [New Section after 8.3.1]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:22:10 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Consider the following note from CMD-WOO: Consider language from 15.8.3 (which will be 14.8.3 after Chapter renumbering) to section 8.3 as fundamental.

15.8.3 Operating Procedures and Practices.

Operating and maintenance procedures shall address personal protective equipment (PPE), including flame-resistant garments, in accordance with the workplace hazard assessment required by NFPA 2113 and Section 8.6.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

13 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

1 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

Abstention

Bujewski, Matthew J.

I am not familiar enough with NFPA 2113 to decide if it should apply to all industries covered under NFPA 660.

**Public Comment No. 138-NFPA 660-2024 [Section No. 8.3.1]****8.3.1***

~~Where the DHA identifies a combustible dust or particulate solid fire, flash fire, or explosion hazard, the~~ The owner/operator shall establish written procedures for operating its facility and equipment to prevent or mitigate fires, flash fires, and explosions from combustible dusts or combustible particulate solids.

Statement of Problem and Substantiation for Public Comment

Chapter 8 does not apply unless the DHA has identified that a fire, flash fire, or explosion hazard exists. There is no need to emphasize that point for any one particular requirement. Therefore, the phrase "where the DHA identifies a combustible dust or particulate solid fire, flash fire, or explosion hazard" is unnecessary.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 09:52:19 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: SR-25-NFPA 660-2024

Statement: Chapter 8 does not apply unless the DHA has identified that a fire, flash fire, or explosion hazard exists. There is no need to emphasize that point for any one particular requirement. Therefore, the phrase "where the DHA identifies a combustible dust or particulate solid fire, flash fire, or explosion hazard" is unnecessary.

**Public Comment No. 48-NFPA 660-2023 [New Section after 8.4.2.1.2]****TITLE OF NEW CONTENT**13.8.4.2.1.1Vacuuming shall be the preferred method of cleaning.13.8.4.2.1.2Where vacuuming is impractical, permitted cleaning methods shall include sweeping and water washdown.**Additional Proposed Changes**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._20.pdf	NFPA 660 CC Note No. 20	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 20 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-HAP: 13.8.4.2.1 language (which will be 15.8.4.2.1 after Chapter renumbering) should be added under 8.4.2.1.2.

13.8.4.2.1.1

Vacuuming shall be the preferred method of cleaning.

13.8.4.2.1.2

Where vacuuming is impractical, permitted cleaning methods shall include sweeping and water washdown.

Related Item

- CC Note 20

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 11:29:52 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-26-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 20-NFPA 660-2023 [New Section after 8.4.2.1.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 11:42:10 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: 13.8.4.2.1 language (which will be 15.8.4.2.1 after Chapter renumbering) should be added under 8.4.2.1.2.

13.8.4.2.1.1

Vacuuming shall be the preferred method of cleaning.

13.8.4.2.1.2

Where vacuuming is impractical, permitted cleaning methods shall include sweeping and water washdown.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 140-NFPA 660-2024 [Section No. 8.4.2.2.1.3]****8.4.2.2.1.3 * –**

~~The operation of portable vacuum cleaning devices shall be subject to a dust hazards analysis to ensure that the risk to personnel and facility operations from fires, flash fires, or explosions is minimized.~~

Statement of Problem and Substantiation for Public Comment

All equipment is supposed to be covered by the DHA, so why single out this particular type of equipment to reinforce the DHA requirement in Chapter 8? A statement like this could be, needlessly, added to every subsection in the chapter. Also, "ensure" and "minimize" are not enforceable.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:17:44 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-27-NFPA 660-2024](#)

Statement: A statement to ensure that portable vacuum cleaning equipment is included in the DHA is needed because vacuums are often overlooked as part of a DHA.

**Public Comment No. 49-NFPA 660-2023 [Section No. 8.4.2.2.1.8]****8.4.2.2.1.8***

Portable vacuum cleaners that meet the following minimum requirements shall be permitted to be used to collect combustible particulate solids in unclassified locations:

- (1) Materials of construction shall comply with 9.6.6.1.
- (2) Hoses shall be conductive or static dissipative.
- (3) All conductive and static dissipative components, including wands and attachments, shall be bonded and grounded.
- (4) The fan or blower shall be on the clean side of the primary filtration media or wet separation chamber.
- (5) Electrical motors shall not be located on the dirty side of the primary filtration media or wet separation chamber unless listed for Class II or Class III, Division 1, as appropriate, or Zone 20 or Zone 21 locations.
- (6)* Where liquids or wet materials are picked up by the vacuum cleaner, paper filter elements shall not be used.
- (7) In addition to the minimum requirements in 8.4.2.2.1.8, if portable vacuum cleaners are used to collect combustible particulate solids in unclassified locations in a facility falling under the scope of this chapter, the following requirements shall be met:
- (8) Dust-laden air shall not pass through the fan or blower.
- (9) The air shall pass through a filter prior to any fan or blower.
- (10) The vacuum cleaner shall not be operated without filter media in place.
- (11) A.13.8.4.2.2.1 The intention of this requirement is to provide specifications for vacuum cleaners that could be used to remove incidental amounts of combustible dusts from unclassified areas in order to maintain the unclassified area designation.
- (12) If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping, by shoveling, or with a portable vacuum cleaner listed as suitable for combustible dust hazardous (classified) locations. Vacuum cleaners meeting the requirements in 8.4.2.2.1 can be used to clean up residual material after the bulk of the spill has been collected.
- (13) These requirements for portable vacuum cleaners also should be applied to the use of vacuum trucks for combustible dust. However, there can be other safety issues concerning vacuum truck applications that are not covered within this section. Given that this application might represent a change from normal procedures, operators should also consider the guidance found in conducting a management of change evaluation.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._19.pdf	NFPA 660 CC Note No. 19	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 19 appeared in the First Draft Report on First Revisions No. 67 in NFPA 660.

Consider the following note from CMD-HAP: Add text from 13.8.4.2.2.1 (which will be 15.8.4.2.2.1 after Chapter renumbering) to 8.4.2.2.1.8

13.8.4.2.2.1* Portable Vacuum Cleaners.

In addition to the minimum requirements in 8.4.2.2.1.8, if portable vacuum cleaners are used to collect combustible particulate solids in unclassified locations in a facility falling under the scope of this chapter, the following requirements shall be met:

- (1) Dust-laden air shall not pass through the fan or blower.
- (2) The air shall pass through a filter prior to any fan or blower.
- (3) The vacuum cleaner shall not be operated without filter media in place.

A.13.8.4.2.2.1 The intention of this requirement is to provide specifications for vacuum cleaners that could be used to remove incidental amounts of combustible dusts from unclassified areas in order to maintain the unclassified area designation.

If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping, by shoveling, or with a portable vacuum cleaner listed as suitable for combustible dust hazardous (classified) locations. Vacuum cleaners meeting the requirements in 8.4.2.2.1 can be used to clean up residual material after the bulk of the spill has been collected.

These requirements for portable vacuum cleaners also should be applied to the use of vacuum trucks for combustible dust. However, there can be other safety issues concerning vacuum truck applications that are not covered within this section. Given that this application might represent a change from normal procedures, operators should also consider the guidance found in conducting a management of change evaluation.



Correlating Committee Note No. 19-NFPA 660-2023 [Section No. 8.4.2.2.1.8]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 11:39:01 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add text from 13.8.4.2.2.1 (which will be 15.8.4.2.2.1 after Chapter renumbering) to 8.4.2.2.1.8

13.8.4.2.2.1* Portable Vacuum Cleaners.

In addition to the minimum requirements in 8.4.2.2.1.8, if portable vacuum cleaners are used to collect combustible particulate solids in unclassified locations in a facility falling under the scope of this chapter, the following requirements shall be met:

- (1) Dust-laden air shall not pass through the fan or blower.
- (2) The air shall pass through a filter prior to any fan or blower.
- (3) The vacuum cleaner shall not be operated without filter media in place.

A.13.8.4.2.2.1 The intention of this requirement is to provide specifications for vacuum cleaners that could be used to remove incidental amounts of combustible dusts from unclassified areas in order to maintain the unclassified area designation.

If a large quantity of material is spilled in an unclassified area, the bulk material should be collected by sweeping, by shoveling, or with a portable vacuum cleaner listed as suitable for combustible dust hazardous (classified) locations. Vacuum cleaners meeting the requirements in 8.4.2.2.1 can be used to clean up residual material after the bulk of the spill has been collected.

These requirements for portable vacuum cleaners also should be applied to the use of vacuum trucks for combustible dust. However, there can be other safety issues concerning vacuum truck applications that are not covered within this section. Given that this application might represent a change from normal procedures, operators should also consider the guidance found in conducting a management of change evaluation.

FR-67-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Related Item

- FR No 67

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 11:37:28 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-28-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental. The other items in 15.8.4.2.2.1 have not been added because they are covered by list item (4).

**Public Comment No. 8-NFPA 660-2023 [Section No. 8.4.2.6.2]****8.4.2.6.2***

Where blowdown using compressed air is used, the following precautions shall be followed:

- (1) Prior to using compressed air, vacuum cleaning, brushing, sweeping, or water washdown methods are used to clean surfaces that can be safely accessed.
- (2) Dust accumulations in the area ~~after~~ shall be reduced as much as possible by first utilizing vacuum cleaning, brushing, sweeping, or water washdown do not exceed the threshold housekeeping dust accumulation limit. washdown methods.
- (3)* Compressed air hoses are equipped with pressure relief nozzles limiting the discharge pressure to 30 psi (207 kPa).
- (4)* All electrical equipment, including lighting, potentially exposed to airborne dust in the area during cleaning is rated appropriately for dust in accordance with *NFPA 70*.
- (5) All ignition sources and hot surfaces capable of igniting a dust cloud or dust layer are shut down or removed from the area.
- (6) After blowdown is complete, residual dust on lower surfaces is cleaned prior to re-introduction of potential ignition sources.
- (7) Where metal or metal-containing dust or powder is not excluded by the criteria of 12.1.1.6.2, the requirements of Chapter 12 apply.

Statement of Problem and Substantiation for Public Comment

If brushing, sweeping, vacuuming, washing was able to reduce the accumulation below the threshold, then there isn't a need for blowdown. Blowdown method is used because the other methods connect fully remove the accumulations. The other methods however should be done first to reduce accumulations as much as possible.

Related Item

- FR136

Submitter Information Verification

Submitter Full Name: Craig Froehling

Organization: Cargill, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 06 13:34:32 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The precaution as written is needed so that the blowdown does not produce a flash fire/explosion hazard while it is happening. The term "reduced as much as possible" is unenforceable.



Public Comment No. 141-NFPA 660-2024 [Section No. 8.4.5 [Excluding any Sub-Sections]]

This section shall apply where the DHA has determined a fire, flash fire, or explosion hazard exists.

Statement of Problem and Substantiation for Public Comment

All equipment is supposed to be covered by the DHA, so why single out this particular type of equipment to reinforce the DHA requirement in Chapter 8? A statement like this could be, needlessly, added to every subsection in the chapter.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:20:03 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: A statement to ensure that vacuum trucks are included in the DHA is needed because they are often overlooked as part of a DHA.



Public Comment No. 260-NFPA 660-2024 [Section No. 8.4.5 [Excluding any Sub-Sections]]

This section shall apply where the DHA has determined a fire, local area flash fire, or equipment explosion hazard exists.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 8.4.5	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:06:21 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 50-NFPA 660-2023 [Section No. 8.4.6.1]****8.4.6.1***

Housekeeping frequency and accumulation goals shall be established to ensure that the accumulated fugitive dust levels on surfaces do not exceed the threshold housekeeping dust accumulation limit.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._106.pdf	NFPA 660 CC Note No. 106	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 106 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-WOO: Consider attaching A.15.9.3.5.3 (which will be A.14.9.3.5.3 after Chapter renumbering) to A.8.4.6.1

15.9.3.5.3* Use of Separation.

A.15.9.3.5.3

Ideally, upward-facing surfaces within the facility are painted a contrasting color to the dust that is being handled. This facilitates recognizing when and where accumulations occur. This information then serves to prioritize and schedule cleaning. It is clearly not recommended that the interior surfaces be the same color as the dust that is apt to escape the process and accumulate within the facility.

One method that has proved useful is to print self-adhesive paper or plastic labels with the words "Clean Enough" in bold black type along with a serial number. These labels are installed at representative locations throughout the facility with the locations recorded on a floor-plan drawing. This allows the facility manager to have employees survey the labels at scheduled frequencies and record which labels were "clean enough" to be read, and which were not. This facilitates focusing the housekeeping efforts where the dust accumulations are developing most rapidly.

Related Item

- CC Note 106

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 11:50:01 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-29-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 106-NFPA 660-2023 [Section No. 8.4.6.1]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:33:46 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Consider the following note from CMD-WOO: Consider attaching A.15.9.3.5.3 (which will be A.14.9.3.5.3 after Chapter renumbering) to A.8.4.6.1

15.9.3.5.3* Use of Separation.

A.15.9.3.5.3

Ideally, upward-facing surfaces within the facility are painted a contrasting color to the dust that is being handled. This facilitates recognizing when and where accumulations occur. This information then serves to prioritize and schedule cleaning. It is clearly not recommended that the interior surfaces be the same color as the dust that is apt to escape the process and accumulate within the facility.

One method that has proved useful is to print self-adhesive paper or plastic labels with the words "Clean Enough" in bold black type along with a serial number. These labels are installed at representative locations throughout the facility with the locations recorded on a floor-plan drawing. This allows the facility manager to have employees survey the labels at scheduled frequencies and record which labels were "clean enough" to be read, and which were not. This facilitates focusing the housekeeping efforts where the dust accumulations are developing most rapidly.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.
Creswell, Gregory F.
Edwards, Brian
Frank, Walter L.
Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 51-NFPA 660-2023 [Section No. 8.5.6]****8.5.6 Use of Portable Equipment.**

Use of portable electrical equipment that does not comply with the electrical classification of the area where it is to be used shall be authorized and controlled in accordance with the hot work procedure as outlined in Section 8.5.

11.8.5.6.1.2

The area affected by the work shall be free from airborne combustible dust.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._62.pdf	NFPA 660 CC Note No. 62	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 62 appeared in the First Draft Report in NFPA 660.

Add the requirement in 11.8.5.6.1.2 to the fundamental requirements in 8.5:

11.8.5.6.1.2

The area affected by the work shall be free from airborne combustible dust.

Related Item

- CC Note 62

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 14:55:29 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-30-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental. Adding the word "visible" makes the requirement qualitative and avoids the absolute requirement.



Correlating Committee Note No. 62-NFPA 660-2023 [Section No. 8.5.6]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 10:33:48 EDT 2023

Committee Statement and Meeting Notes

Committee Statement: Add the requirement in 11.8.5.6.1.2 to the fundamental requirements in 8.5:

11.8.5.6.1.2

The area affected by the work shall be free from airborne combustible dust.

Ballot Results

✓ This item has passed ballot

18 Eligible Voters

3 Not Returned

13 Affirmative All

1 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

Negative with Comment

Bujewski, Matthew J.

The language ("free") is unenforceable and you can have a safe working environment (from a fire and explosion standpoint) as long as the dust concentration is below the explosive limit.

**Public Comment No. 195-NFPA 660-2024 [New Section after 8.6.1.1]****TITLE OF NEW CONTENT**

A8.6.1 Historically, operators of facilities have resorted to the use of FRG where the housekeeping program was not sufficient to maintain the level of accumulated fugitive dust below the Threshold Housekeeping Dust Accumulation (Maximum Layer Thickness or Threshold Mass) computed for the facility in accordance with applicable commodity-specific chapter. However, a review of the performance criteria established in NFPA 2112 for FRG shows that the design criteria are derived from calculations for a defined fire size and exposure time duration. When the size of the deflagration flame or the exposure time exceeds the thermal dose for which FRG has been designed, the exposed personnel will probably sustain burn injuries. Consequently, it is critical to distinguish those locations where FRG can be expected to prevent burn injury of personnel from those where it cannot.

NFPA 2112 established the performance criterion of a radiant flux of 84 kW/m^2 for 3 seconds as the thermal exposure for which the FRG was intended to prevent thermal burn injury of the wearer. Radiant intensity multiplied by exposure time is the "thermal dose". The resultant thermal dose from a radiant exposure of 84 kW/m^2 for 3 seconds is 252 kJ/m^2 . This thermal dose establishes the magnitude of the combustion event for which FRG designed in accordance with NFPA 2112 is sufficient to prevent personnel injury.

Before a facility operator can rely on FRG to ensure the safety of personnel in a building compartment, she/he must determine the maximum foreseeable thermal dose to personnel in that building compartment. Where the maximum foreseeable thermal dose exceeds 252 kW/m^2 FRG should not be relied upon as a means of preventing personnel burn injury. **Annex AA** ***Guide for Computing Thermal Dose to Personnel from Flash Fires and Building Compartment Deflagrations*** provides one means of computing the thermal dose to personnel for determining where FRG can be relied upon.

Type your content here ...

This annex text is needed to explain the technical basis for the limitation on where FRG can be relied upon. It serves as the pointer for a more detailed presentation on one means by which the user can determine how to comply with the requirement, specifically proposed Annex AA.

Statement of Problem and Substantiation for Public Comment

This annex text is proposed to provide the technical basis for the requirement and as a pointer to a separate Annex AA that provides one means of complying with the requirement.

Related Item

- 8.6.1

Submitter Information Verification

Submitter Full Name: John Cholin

Organization: J. M. Cholin Consultants Inc.

Street Address:

City:

State:

Zip:

Submission Date: Tue Jan 02 13:19:13 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-31-NFPA 660-2024

Statement: This annex text is needed to explain the technical basis for the limitation on where FRG can be relied upon. It serves as the pointer for a more detailed presentation on one means by which the user can determine how to comply with the requirement.

**Public Comment No. 196-NFPA 660-2024 [New Section after 8.6.1.2]****TITLE OF NEW CONTENT**

A.8.6.2 Where the maximum foreseeable thermal dose exceeds 252 kJ/m^2 , FRG designed in accordance with NFPA 2112 cannot prevent burn injury of exposed personnel. Consequently, reliance on FRG is not permitted for those areas. ..

Statement of Problem and Substantiation for Public Comment

Since the thermal dose management capacity of FRG is limited to 252 kJ/m^2 , the facility operator cannot be permitted to rely on it for personnel safety in those portions of the facility where the hazard exceeds the ability of the management means. A clear prohibition statement is needed for clarity.

Related Item

- 8.6.2

Submitter Information Verification

Submitter Full Name: John Cholin

Organization: J. M. Cholin Consultants Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Tue Jan 02 13:27:46 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-32-NFPA 660-2024

Statement: This annex is needed to explain that since the thermal dose management capacity of FRG is limited to 252 kJ/m^2 , the facility operator cannot be permitted to rely on it for personnel safety in those portions of the facility where the hazard exceeds the ability of the management means.



Public Comment No. 52-NFPA 660-2023 [Section No. 8.7.1]

8.7.1*

Equipment affecting the prevention, control, and mitigation of combustible dust fires, flash fires, and explosions shall be inspected, tested, and maintained in accordance with the applicable NFPA standard and the manufacturers' recommendations.

11.8.7.1

Where there is no applicable NFPA standard, equipment shall be inspected, tested, and maintained in accordance with manufacturers' recommendations, as modified by operational experience.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._68.pdf	NFPA 660 CC Note No. 68	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 68 appeared in the First Draft Report on First Revisions No. 78 in NFPA 660.

Related Item

- FR No 78

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 15:00:59 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-33-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.

**Public Comment No. 9-NFPA 660-2023 [Section No. 8.7.2]****8.7.2**

The inspection, testing, and maintenance program shall include the following:

- (1) Fire and explosion protection and prevention equipment in accordance with the applicable NFPA standards
- (2) Dust control equipment
- (3) Housekeeping equipment
- (4)* ~~Potential ignition sources~~
- (5) Electrical, process, and mechanical equipment
- (6) * Instrumentation, including process interlocks
- (7) Lubrication of bearings
- (8) * Tramp metal detection and removal devices

Statement of Problem and Substantiation for Public Comment

The requirement is to test and maintain ignition sources (item #4). In reality, one doesn't maintain ignition sources, you maintain the equipment to prevent ignition sources. So it is suggested to delete 'ignition sources' from the list of maintainable items. The annex can be associate with item #5 to give an indication of what to look for during maintenance and testing.

Related Item

- FR77

Submitter Information Verification

Submitter Full Name: Craig Froehling

Organization: Cargill, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 06 13:49:52 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: An inspection program needs to include an inspection of equipment that provides potential ignition sources.

**Public Comment No. 53-NFPA 660-2023 [New Section after 8.7.6]****TITLE OF NEW CONTENT**12.8.7.3.2

The inspection and testing shall be conducted by a person(s) knowledgeable in the proper practices who shall document the findings and recommendations.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No_72.pdf	NFPA 660 CC Note No. 72	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 72 appeared in the First Draft Report in NFPA 660.

Add the following requirement to 8.7.6:

12.8.7.3.2

The inspection and testing shall be conducted by a person(s) knowledgeable in the proper practices who shall document the findings and recommendations.

Related Item

- CC Note 72

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 13 15:05:07 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-34-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 72-NFPA 660-2023 [New Section after 8.7.6]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 11:49:56 EDT 2023

Committee Statement

Committee Statement: Add the following requirement to 8.7.6:

12.8.7.3.2

The inspection and testing shall be conducted by a person(s) knowledgeable in the proper practices who shall document the findings and recommendations.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 205-NFPA 660-2024 [New Section after 8.8]

Container Labeling and Safety Data Sheets

8.8.6*

The owner/operator shall promote hazard awareness regarding combustible dusts and particulate solids within the facility through a comprehensive program including container labeling and other forms of warning, safety data sheets, and training as described previously in this section. Contractors shall be included in this program as applicable.

A.8.8.6

Mandatory requirements for such a program including labeling and other forms of warning, safety data sheets, and training are contained in 29 CFR 1910.1200.

Additional guidance can be found in the United Nations publication Globally Harmonized System of Classification and Labeling of Chemicals (GHS), 9th Edition.

8.8.6.1

The owner/operator shall employ labels and other forms of warning to ensure hazard awareness of combustible dust and particulate solids.

8.8.6.1.1

Warning, caution, and/or safety instruction signs as appropriate shall be affixed and/or otherwise displayed on equipment, or at the entrances to places where fire, flash fire, and explosion hazards exist within the facility.

8.8.6.1.2

Containers of combustible dusts and/or combustible particulate solids within the facility shall be labeled to indicate the product identifier, signal word, hazard statement(s), pictogram(s), precautionary statement(s); and contact information of the manufacturer, importer, or other responsible party as applicable, or a combination thereof which identify the contents of the container and provide at least general information regarding the hazards of the contents.

8.8.6.2*

Owner/operators who are not the manufacturers of the combustible dusts and/or particulate solids used, stored, and/or handled within their facilities shall gather, maintain, and make available safety data sheets for each of these materials present within their facilities.

A.8.8.6.2

The safety data sheet for combustible dusts and/or particulate solids should identify the substance as hazardous in Section 2: Hazard Identification. This shall be accomplished using the phrases "May form explosible dust-air mixture if dispersed", "May form explosible dust-air mixture if small particles are generated during further processing, handling, or by other means", or similar language in conjunction with the word "Warning".

The safety data sheet for combustible dusts and/or particulate solids should address the requirements for fighting a fire caused by the combustible dust or arising in the vicinity of combustible dusts and/or combustible particulate solids in Section 5: Fire-Fighting Measures.

The safety data sheet for combustible dusts and/or particulate solids shall address guidance on safe handling practices that minimize the potential hazards to people, property, and the environment from the combustible dust and/or combustible particulate solid in Section 7: Handling and Storage.

The safety data sheet for combustible dusts and/or particulate solids shall address basic physical and chemical properties, data relevant regarding physical hazard classes, and further safety characteristics as appropriate in Section 9: Physical and Chemical Properties. Section 9 of safety data sheets for combustible dusts and/or particulate solids should indicate relevant safety characteristics such as lower explosion limit/ minimum explosible concentration, minimum ignition energy, deflagration index (Kst), maximum explosion pressure, etc. where such information is known. The particle characteristics to which the data apply if different from the particle characteristics as indicated elsewhere in Section 9 should also be indicated.

Where owner/operator determines information on safety data sheet is incorrect or incomplete, the responsible party for the SDS identified in Section 1: Identification should be contacted and informed of the situation.

8.8.6.3

All information relied upon by owners/operators to ensure hazard awareness of combustible dust and/or particulate solid hazards within the facility shall be immediately available for reference by workers.

Statement of Problem and Substantiation for Public Comment

The requirements for SDSs for owner/operators have been changed to annex material to emphasize the importance of accurate information, help owner/operators find information relevant to combustible dust on SDSs, and encourage owner/operators to contact manufacturers when inaccurate or incomplete information is listed on an SDS.

Regarding redundancy, some of the requirements of NFPA 660 are redundant. These redundancies serve a vital function where existing regulations are vague, not well known, or are not enforceable as assumed. Examples of existing redundancies include 8.4.2.6.2(3) requiring compressed air be discharged at a pressure not higher than 30 PSI (29 CFR 1910.242(b)), 8.6.2 containing requirements for a workplace hazard assessment for PPE (29 CFR 1910.132(d), and various requirements related to electrical equipment being rated for hazardous classified locations where necessary (29 CFR 1910.307(c)).

The requirements proposed are essential for increasing awareness of combustible dust hazards. This increase in awareness is essential for the standard to fulfill its stated purpose.

Related Item

- PI 199

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:07:41 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: SDS requirements are already covered by HazCom, Signs, and other OSHA standards. Adopting these requirements could also cause confusion because it implies that NFPA 660 is now in charge of determining the required information and language on a SDS and chemical label when OSHA is the controlling body for these requirements in the US.



Public Comment No. 54-NFPA 660-2023 [Section No. 8.8]

8.8 Training and Hazard Awareness.

8.8.1*

Employees, contractors, temporary workers, and visitors shall be included in a training program according to the potential exposure to combustible dust hazards and the potential risks to which they might be exposed or could cause.

8.8.2

The training provided shall include instruction on actions to be taken in the event of an emergency to prevent or minimize the effects of exposure to fires, flash fires, and explosions, including information on safe evacuation routes in accordance with 8.10.1.

8.8.3*

General safety training and hazard awareness training for combustible dusts and solids shall be provided to all affected employees.

8.8.3.1*

Job-specific training shall ensure that employees are knowledgeable about fire, flash fire, and explosion hazards of combustible dusts and particulate solids in their work environment.

8.8.3.2

Employees shall be trained before taking on job-related responsibilities.

8.8.3.3*

Where explosion protection systems or emergency shutdown systems are installed, training of affected personnel shall include the operations and potential hazards presented by such systems.

8.8.4

Refresher training shall be provided as required by the applicable industry- or commodity-specific chapters of this standard.

8.8.5

The training shall be documented.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._79.pdf	NFPA 660 CC Note No. 79	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 79 appeared in the First Draft Report on First Revisions No. 81 and 82 in NFPA 660.

Determine a list of fundamental training topics to be included in Chapter 8. Review the training topics in 8.8.1 through 8.8.5, 12.8.8.3, 13.8.8.3, 14.8.6.4, 15.8.8.2, and 15.8.8.3 for example.

(After chapter renumbering, this will be 8.8.1 through 8.8.5, 12.8.8.3, 13.8.6.4, 14.8.8.2, 14.8.8.3, and 15.8.8.3)

Related Item

- FR 81 an 82

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:09:12 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action:	Rejected but see related SR
Resolution:	SR-76-NFPA 660-2024
Statement:	Training requirements that were contained in multiple industry- or commodity-specific chapters were deemed fundamental and consolidated here.



Correlating Committee Note No. 79-NFPA 660-2023 [Section No. 8.8]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 13:54:57 EDT 2023

Committee Statement

Committee Statement: Determine a list of fundamental training topics to be included in Chapter 8. Review the training topics in 8.8.1 through 8.8.5, 12.8.8.3, 13.8.8.3, 14.8.6.4, 15.8.8.2, and 15.8.8.3 for example.

(After chapter renumbering, this will be 8.8.1 through 8.8.5, 12.8.8.3, 13.8.6.4, 14.8.8.2, 14.8.8.3, and 15.8.8.3)

[FR-81-NFPA 660-2023](#)

[FR-82-NFPA 660-2023](#)

Ballot Results

✔ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

13 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Bujewski, Matthew J.

The list should be very narrow if it is to apply to all industries. In the past, requirements that were not fundamental have been included in such lists.

**Public Comment No. 261-NFPA 660-2024 [Section No. 8.8.3.1]****8.8.3.1***

Job-specific training shall ensure that employees are knowledgeable about fire, flash fire (local/building compartment) , and explosion (building/equipment) hazards of combustible dusts and particulate solids in their work environment.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new proposed recommendations in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 8.8.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:08:32 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 204-NFPA 660-2024 [Section No. 8.8.4]****8.8.4**

Refresher training shall be ~~provided as provided~~ at least every three years after initial training or a s required by the applicable industry- or commodity-specific chapters of this standard, whichever is shorter .

Statement of Problem and Substantiation for Public Comment

I don't agree that refresher training based on a lack of hazard awareness being unenforceable. OSHA enforces refresher training requirements for personal protective equipment (PPE) at 29 CFR 1910.132(f)(3) and powered industrial trucks (PITs) 29 CFR 1910.178(l)(4)(ii) under this premise. In any case, a minimum frequency of refresher training needs to be established as a fundamental. Many of the commodity specific chapters still do not presently address a minimum frequency for refresher training.

Related Item

- PI 198

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:04:29 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-35-NFPA 660-2024

Statement: A minimum frequency of refresher training needs to be established as a fundamental. Many of the commodity specific chapters still do not presently address a minimum frequency for refresher training. The other chapters can then establish a shorter minimum frequency in accordance with the Conflict language in 1.6.

**Public Comment No. 55-NFPA 660-2023 [Section No. 8.9]****8.9 Contractors.****8.9.1**

Owner/operators shall ensure the requirements of Section 8.9 are met.

8.9.2

Only qualified contractors shall be employed for work involving the installation, repair, or modification of buildings (interior and exterior), machinery, and fire and explosion protection equipment that could adversely affect the prevention, control, or mitigation of fires, flash fires, and explosions.

8.9.3* Contractor Training.**8.9.3.1**

Contractors operating owner/operator equipment shall be trained and qualified to operate the equipment and perform the work.

8.9.3.2*

The training provided to contractors shall be equivalent to the training that would be provided to employees who could operate the same equipment.

8.9.3.3

Contractor training shall be documented.

8.9.3.4*

Contractors working on or near a given process shall be made aware of the potential hazards from and exposures to fires, flash fires, and explosions.

8.9.3.5

Contractors shall be trained and required to comply with the facility's safe work practices and policies in accordance with 8.3.3.

8.9.3.6

Contractors shall be trained on the facility's emergency response and evacuation plan, including, but not limited to, emergency reporting procedures, safe egress points, and evacuation area.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._81.pdf	NFPA 660 CC Note No. 81	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 81 appeared in the First Draft Report on First Revisions No. 83 and 84 in NFPA 660.

In 13.8.9 and 14.8.7 (will be 13.8.7 and 15.8.9 after chapter moves), resolve whether Chapter 15 is the appropriate part of NFPA 69 to reference. If not, identify the correct section to reference. If the appropriate language is not in NFPA 69, this reference should be removed and/or Public Input should be sent to NFPA 69.

Related Item

- FR No. 83 and 84

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Tue Dec 19 08:12:45 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-36-NFPA 660-2024](#)

Statement: The statement for refresher training was previously included in an industry-specific chapter and has been deemed fundamental.

The other statements have been reordered so that the requirement for documentation comes at the end of the training content requirements.



Correlating Committee Note No. 81-NFPA 660-2023 [Section No. 8.9]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 14:14:07 EDT 2023

Committee Statement

Committee Statement: Add the following requirement to fundamentals:

11.8.9.3 Contractor Training.

Contractors shall receive refresher training annually.

[FR-83-NFPA 660-2023](#)

[FR-84-NFPA 660-2023](#)

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

13 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Frank, Walter L.

Once "Contractors shall receive refresher training annually" is made fundamental, is the intent to delete 11.8.9.3? The concept underlying the question could be applied to a number of the CNs.



Public Comment No. 263-NFPA 660-2024 [Section No. 8.9.3.4]

8.9.3.4*

Contractors working on or near a given process shall be made aware of the potential hazards from and exposures to fires, flash fires (local/building compartment) , and explosions (building/equipment) .

Statement of Problem and Substantiation for Public Comment

This modification it tied to the new definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 8.9.3.4	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:12:21 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 209-NFPA 660-2024 [Section No. 8.10.1.2]****8.10.1.2**

The emergency response plan shall include, but not be limited to, the following:

- (1)* A means of notification for occupants in the event of fire and explosion
 - (2) A preplanned evacuation assembly area
 - (3) A person(s) designated to notify emergency responders, including the fire department
 - (4) A facility layout drawing(s) showing egress routes, hazardous chemical locations, and fire protection equipment
 - (5) Location of a safety data sheet(s) for hazardous chemicals
 - (6) An emergency telephone number(s)
 - (7) Emergency response duties for occupants
 - (8) A person(s) designated to meet the offsite emergency responder(s) to coordinate the incident
- Add Annex Material to 8.10.1.2(1): The means of notification should meet the minimum requirements specified in 29 CFR 1910.165 and made in accordance with the requirements of Chapter 24 Emergency Communications Systems (ECS) of NFPA 72 as applicable.

Statement of Problem and Substantiation for Public Comment

The utility in providing options to the user community ends where seemingly appropriate choices available to them are insufficient to achieve the desired end. Annex material such as what has been proposed will help ensure the means of notification selected is appropriate.

Related Item

- PI 220

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:15:22 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-68-NFPA 660-2024

Statement: This annex material will guide users to sources of information on occupant notification systems to help ensure the means of notification selected is appropriate.

**Public Comment No. 215-NFPA 660-2024 [Section No. 8.11]****8.11*** Incident Investigation.A. 8.11

Add " [See CCPS "Guidelines for Investigating Process Safety Incidents" for additional guidance on incident investigation](#) . " at the end of the existing annex material.

8.11.1

The owner/operator shall have a system to ensure that incidents that result in a fire, flash fire, or explosion are reported and investigated.

8.11.2*

Events that could have resulted in fires, flash fires, or explosions under different circumstances but where property losses or injuries were not experienced shall be investigated.

8.11.3

The investigation shall be documented and include findings and recommendations.

8.11.4

A system shall be established to address and resolve the findings and recommendations.

8.11.5*

The investigation findings and recommendations shall be reviewed with affected personnel.

Statement of Problem and Substantiation for Public Comment

Investigating incidents and near misses is a complicated topic requiring implementation guidance. The existing annex language provides an excellent base level of information but is an inappropriate vehicle for the breadth of information necessary to ensure effective incident investigation. The CCPS publication listed is an excellent voluntary resource for the user community in search of further guidance.

The CSB's investigation of the 2017 Didion Milling Company Explosion and Fire revealed several issues with the company's incident investigation practices which contributed to the incident and its severity. It is imperative that users of the standard have reliable sources of guidance in implementing the requirements of NFPA 660. The CSB made the following recommendation to the NFPA as a result of this investigation:

Update NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, or a successor standard, to incorporate, at a minimum, the following elements:

1. Unify the requirements for performing dust hazard analyses to remove equipment exemptions and require the assessment of all processes, such as cyclones, as required in:
 - a. The 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust
 - b. Chapters 3, 5, and 6 of the CCPS's Guidelines for Combustible Dust Hazard Analysis.
2. Incorporate the additional guidance for Management of Change to include but not limited to:
 - a. Harmonize the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, requirements for section 8.12.2.4, modifications to operating and maintenance procedures, and section 8.12.2.4, employee training requirements.
 - b. Chapter 3 and Appendix B of the CCPS's Guidelines for the Management of Change for Process Safety, such as addressing temporary changes, operating and maintenance procedures, employee training, and dust testing results, to standardize MOC requirements across all industries that handle combustible dust.
3. Update the requirements for incident investigation management systems, to include but not limited to:
 - a. Incorporate the optional guidance of the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, as a mandatory requirement.
 - b. Chapters 4 and 10 of CCPS's Guidelines for Investigating Process Safety Incidents (3rd Edition).

Adopting this language would address subparagraph 3. Item b. of this recommendation.

Related Item

- FR 88

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:
Zip:
Submittal Date: Wed Jan 03 10:47:48 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-38-NFPA 660-2024](#)
Statement: Investigating incidents and near misses is a complicated topic requiring implementation guidance. The existing annex language provides an excellent base level of information but does not provide the breadth of information necessary to ensure effective incident investigation. The CCPS publication listed is an excellent voluntary resource for the user community in search of further guidance.

**Public Comment No. 56-NFPA 660-2023 [New Section after 8.11.3]****TITLE OF NEW CONTENT**

(After chapter renumbering, references to Chapter 13 text will be located in Chapter 15.)

Consider moving the content of 13.8.11.1 to make a new 8.11.3 and renumber subsequent sections.

Consider replacing the current 8.11.3 with the text from Section 13.8.11.2. This would become 8.11.4. Also, move the associated annex material for 13.8.11.2 to the new 8.11.4 (but, see next recommendation).

Move the last two paragraphs (after the numbered list) from A.13.8.11.2 to A.8.11.5 (some massaging of text may be required).

If the above recommendations are adopted, 13.8.11.1 and 13.8.11.2 could be deleted.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._85.pdf	NFPA 660 CC Note No. 85	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 85 appeared in the First Draft Report in NFPA 660.

Related Item

- CC Note 85

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:15:57 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-39-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 85-NFPA 660-2023 [New Section after 8.11.3]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 15:16:41 EDT 2023

Committee Statement

Committee Statement: (After chapter renumbering, references to Chapter 13 text will be located in Chapter 15.)

Consider moving the content of 13.8.11.1 to make a new 8.11.3 and renumber subsequent sections.

Consider replacing the current 8.11.3 with the text from Section 13.8.11.2. This would become 8.11.4. Also, move the associated annex material for 13.8.11.2 to the new 8.11.4 (but, see next recommendation).

Move the last two paragraphs (after the numbered list) from A.13.8.11.2 to A.8.11.5 (some massaging of text may be required).

If the above recommendations are adopted, 13.8.11.1 and 13.8.11.2 could be deleted.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok



Public Comment No. 201-NFPA 660-2024 [Section No. 8.12]

8.12* Management of Change.

A. 8.12

[Add Annex Material: See CCPS "Guidelines for the Management of Change for Process Safety" for additional guidance on management of change .](#)

8.12.1*

Written procedures shall be established and implemented to manage proposed changes to process materials, staffing, job tasks, technology, equipment, procedures, and facilities.

8.12.2

The procedures shall ensure that the following are addressed prior to any change:

- (1) * The technical basis for the proposed change
- (2) * Safety and health implications
- (3) Whether the change is permanent or temporary, including the authorized duration of temporary changes
- (4) Modifications to operating, maintenance, and emergency response procedures
- (5) Employee training requirements
- (6) Authorization requirements for the proposed change
- (7) Results of characterization tests used to assess the hazard, if conducted
- (8) Implementation of any recommendations required for safe operation of the change before startup
- (9) Confirmation that the change has been implemented per design prior to startup

8.12.3*

Implementation of the management of change procedure shall not be required for replacements-in-kind.

8.12.4*

Process and technology documentation shall be updated to incorporate the change.

Statement of Problem and Substantiation for Public Comment

Although the dictionary may define the terms 'change', 'technical', and 'basis', and those definitions may be appropriate for their usage in this standard management of change is a complicated topic warranting implementation guidance. The existing annex information provides excellent base level information but is an inappropriate vehicle for the breadth of information necessary to ensure effective management of change. The CCPS publication listed is an excellent resource for the user community in search of further guidance.

The CSB's investigation of the 2017 Didion Milling Company Explosion and Fire revealed several issues with the company's management of change practices which directly contributed to the incident. It is imperative that users of the standard have reliable sources of guidance in implementing the requirements of NFPA 660. The CSB made the following recommendation to the NFPA as a result of this investigation:

Update NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, or a successor standard, to incorporate, at a minimum, the following elements:

1. Unify the requirements for performing dust hazard analyses to remove equipment exemptions and require the assessment of all processes, such as cyclones, as required in:
 - a. The 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust
 - b. Chapters 3, 5, and 6 of the CCPS's Guidelines for Combustible Dust Hazard Analysis.
2. Incorporate the additional guidance for Management of Change to include but not limited to:
 - a. Harmonize the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, requirements for section 8.12.2.4, modifications to operating and maintenance procedures, and section 8.12.2.4, employee training requirements.
 - b. Chapter 3 and Appendix B of the CCPS's Guidelines for the Management of Change for Process Safety, such as addressing temporary changes, operating and maintenance procedures, employee training, and dust testing results, to standardize MOC requirements across all industries that handle combustible dust.
3. Update the requirements for incident investigation management systems, to include but not limited to:
 - a. Incorporate the optional guidance of the 2019 edition of NFPA 652, Standard on the Fundamentals of Combustible Dust, as a mandatory requirement.
 - b. Chapters 4 and 10 of CCPS's Guidelines for Investigating Process Safety Incidents (3rd Edition).

Adopting this language would address subparagraph 2. Item b. of this recommendation.

Related Item

- PI 187 and PI 188

Submitter Information Verification

Submitter Full Name: Adam Henson
Organization: U.S. Chemical Safety Board
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 09:54:50 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-40-NFPA 660-2024](#)
Statement: Although the dictionary may define the terms 'change', 'technical', and 'basis', and those definitions may be appropriate for their usage in this standard, management of change is a complicated topic warranting implementation guidance. The CCPS publication listed is an excellent resource for the user community in search of further guidance.

**Public Comment No. 276-NFPA 660-2024 [Section No. 8.13]**

Replace existing 8.13 – Pre-Startup Safety Review.

8.13.1 –

~~The owner/operator shall perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require change in the process and technology information required by 8.14.1(5) .~~

8.13.2 –

~~The pre-startup safety review shall confirm the following prior to the operation of a process:~~

- ~~(1) Construction and equipment are in accordance with design specifications.~~
- ~~(2) Safety, operating, maintenance, and emergency procedures are in place and are adequate.~~
- ~~(3) For new facilities, a DHA has been performed and action items have been resolved or implemented before startup.~~
- ~~(4) Modified facilities meet the requirements contained in Section 8.12 .~~

~~with text provided in attached file.~~

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Proposed_revision_to_8.13..docx	Word file with proposed revisions	

Statement of Problem and Substantiation for Public Comment

A task group was formed to "review the text added by First Revision no. 92 to align with the concept of an operational readiness review." The attached file provides revisions proposed for 8.13 to accomplish this. This Public Comment is one of several needed to achieve the task team assignment.

Related Item

- FR 92

Submitter Information Verification

Submitter Full Name: Walter Frank
Organization: Frank Risk Solutions, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:47:24 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-41-NFPA 660-2024
Statement: New, modified, or formerly idled facilities require a review prior to startup to verify that all required conditions exist and required safety tasks have been completed. This revision aligns the pre-startup safety review with the concept of an operational readiness review.

Proposed Text To Align The Concepts Of Pre-Startup Safety Review And Operational Readiness Review.

8.13* Operational Readiness Review (ORR).

A.8.13 An ORR is intended to ensure that, before start-up, a facility is mechanically ready, related management systems (e.g., procedures, training, and inspection, testing, and preventive maintenance programs) have been updated, and personnel are prepared to safely start-up and operate the facility.

8.13.1*

The owner/operator shall perform an operational readiness review before the start-up of:

- (1) New facilities
- (2) Modified facilities when the modification is significant enough to require change in the process and technology information required by 8.14.1(5)
- (3) Facilities that have been shut down for minor maintenance activities
- (4) Facilities that are periodically shut down as part of normal operations
- (5)* Facilities that have been shut down for extended periods of time

A.8.13.1 The owner/operator should consider extending the coverage of the ORR program to include other types of shutdowns such as, but not limited to, emergency shutdowns and precautionary shutdowns in anticipation of external events such as severe storms. The intent of the ORR program is that any facility that has been shut down will receive a review, whose scope is commensurate with the nature and duration of the shutdown, before the facility is returned to service. [See: CCPS, Guidelines for Risk Based Process Safety, Wiley, 2007]

A.8.13(5) An examples of such shutdowns would be facilities that have been idled for an extended period (e.g., months or longer) for business reasons. Such facilities might be returned to service with little or no modification. However, changes in associated facilities, changes in feed specifications, changes in risk control requirements, potential degradation of equipment, etc., might warrant a detailed review, including a DHA update, before the facility is returned to service. Another example would be facilities that have been shut down for major maintenance activities.

8.13.2*

The scope and detail of the operational readiness review shall consider the nature and duration of the shut down and shall confirm the following prior to start-up of the facility:

A.8.13.2 The lists provide the basic requirements for the ORR for various types of changes. Additional factors may be relevant to particular start-ups. The owner/operator should carefully assess the nature and duration of the shutdown and determine if additional confirmations are warranted for a safe start-up.

8.13.2.1 For new facilities:

- (1) Construction and equipment are in accordance with design specifications.
- (2) A DHA has been performed in conformance with Chapter 7 and action items have been resolved or implemented before startup.
- (3) Accurate, up-to-date safety, operating (including startup), maintenance, and emergency procedures are in place
- (4) Affected personnel have been trained on relevant procedures
- (5) Inspection and testing of safety systems and equipment have been conducted

8.13.2.2 For modified facilities:

- (1) A management of change review has been conducted in conformance with Section 8.12 and action items have been resolved or implemented before startup
- (2) Construction and equipment are in accordance with design specifications
- (3) Accurate, up-to-date safety, operating (including startup), maintenance, and emergency procedures are in place
- (4) Affected personnel have been trained on relevant procedures
- (5) Inspection and testing of safety systems and equipment have been conducted

8.13.2.3 For facilities that have been shut down for minor maintenance:

- (1) Construction and equipment are in accordance with design specifications.
- (2) A joint inspection by maintenance and operations personnel has verified that the maintenance has been correctly completed
- (3) Accurate, up-to-date startup procedures are in place

8.13.2.4 For facilities that have been shut down as part of normal operations:

- (1) A walk-through inspection has verified that the facility is ready for start-up
- (2) Accurate, up-to-date startup procedures are in place

8.13.2.5 For facilities that have been shut down for extended periods of time:

- (1) A DHA has been performed in conformance with Chapter 7 and action items have been resolved or implemented before startup.

- (2) Construction and equipment are in accordance with design specifications.
- (3) Accurate, up-to-date safety, operating (including startup), maintenance, and emergency procedures are in place
- (4) Affected personnel have been trained on relevant procedures
- (5) Inspection and testing of safety systems and equipment have been conducted

8.13.3*

The operational readiness review shall be documented and the documentation retained in conformance with 8.14.1(7).

A.8.13.2 The extent of the ORR documentation should consider the nature and duration of the shutdown. For a maintenance shutdown the documentation could be signatures on the work order after a joint inspection by maintenance and operations. For a routine start-up of a facility that has been shut down as part of normal operations the documentation could be a completed start-up procedure. For new facilities, modified facilities, and facilities that are to start up after an extended outage, the documentation would likely be more extensive, incorporating one or more detailed checklists. To avoid making the documentation task burdensome, 8.14.1(7) only requires retention of documentation for these more detailed ORRs.

An alternate approach to 8.13.2 is shown below:

8.13.2*

The scope and detail of the operational readiness review shall consider the nature and duration of the shut down and shall confirm the completion or existence of prerequisites shown in Table 8.13.2 prior to start-up of the facility:

A.8.13.2 Table 8.13.2 provides the basic requirements for the ORR for various types of changes. Additional factors may be relevant to particular start-ups. The owner/operator should carefully assess the nature and duration of the shutdown and determine if additional confirmations are warranted for a safe start-up.

Table 8.13.2 Operational Readiness Review Requirements for Types of Shutdowns

Required Review Confirmations	For Shutdowns Described In				
	8.13.2.1	8.13.2.2	8.13.2.3	8.13.2.4	8.13.2.5
Construction and equipment are in accordance with design specifications	X	X	X		X
A DHA has been performed in conformance with Chapter 7 and action items have been resolved or implemented before startup	X				X
Accurate, up-to-date safety, operating (including startup), maintenance, and emergency procedures are in place	X	X			X
Accurate, up-to-date startup procedures are in place			X	X	
Affected personnel have been trained on relevant procedures	X	X			X
A management of change review has been conducted in conformance with Section 8.12 and action items have been resolved or implemented before startup		X			
A joint inspection by maintenance and operations personnel has verified that the maintenance has been correctly completed			X		
A walk-through inspection has verified that the facility is ready for start-up				X	
Inspection and testing of safety systems and equipment have been conducted	X	X			X

**Public Comment No. 288-NFPA 660-2024 [Section No. 8.14.1]**

Insert a new 8.14.1 (7) and renumber subsequent items in the list.

8.14.1

The owner/operator shall establish a program and implement a process to manage the retention of documentation, including, but not limited to, the following:

- (1) Training records
- (2) Equipment inspection, testing, and maintenance records
- (3) * Incident investigation reports
- (4) * Dust hazards analyses and resolution of DHA recommendations
- (5) * Process and technology information
- (6) * Management of change documents
- (7) Operational readiness review documents for start-up associated with 8.13.2.1, 8.13.2.2, and 8.13.2.5.
- (8) Emergency response plan documents
- (9) * Contractor records

Statement of Problem and Substantiation for Public Comment

The changes proposed for 8.13, per Public Comment 276, create additional documentation that needs to be added to the list in 8.14.1. This is important documentation that needs to be retained.

Related Item

- FR 92

Submitter Information Verification

Submitter Full Name: Walter Frank

Organization: Frank Risk Solutions, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Thu Jan 04 15:59:39 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-43-NFPA 660-2024

Statement: The changes made to 8.13 create additional documentation that needs to be added to the list in 8.14.1. This is important documentation that needs to be retained.



Public Comment No. 57-NFPA 660-2023 [Section No. 9.2.1]

9.2.1*

A documented risk assessment shall be permitted to determine the required protections in Chapter 9.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._43.pdf	NFPA 660 CC Note No. 43	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 43 appeared in the First Draft Report in NFPA 660.

to 11.9, 12.9, 13.9, 14.9, and 15.9 to clarify that this applies to the requirements in those chapters also.

Related Item

- CC Note 43

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:19:09 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The committee is not clear about what this addition would provide. All of the other chapters are "Reserved" in X.9.2 so this requirement applies to all industries and commodities based on the conflict language in Chapter 1.



Correlating Committee Note No. 43-NFPA 660-2023 [Section No. 9.2.1]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 16:21:07 EDT 2023

Committee Statement

Committee Statement: Add reference to 11.9, 12.9, 13.9, 14.9, and 15.9 to clarify that this applies to the requirements in those chapters also.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 58-NFPA 660-2023 [Section No. 9.2.2]

9.2.2

Upon request, the AHJ shall be provided with sufficient documentation to support the validity and relevance of the risk assessment methodology- ~~permitted in Chapter 9~~.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No_44.pdf	660 CCN No. 44	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 44 appeared in the First Draft Report in NFPA 660.

Delete "permitted in Chapter 9" based on the recommended change to 9.2.1.

Related Item

- CC Note 44

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:21:09 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The related change in 9.2.1 was not made.



Correlating Committee Note No. 44-NFPA 660-2023 [Section No. 9.2.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 16:23:49 EDT 2023

Committee Statement

Committee Statement: Delete "permitted in Chapter 9" based on the recommended change to 9.2.1.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 133-NFPA 660-2023 [Section No. 9.3.1]****9.3.1*** Construction.

~~The type of construction shall be~~ Buildings that handle combustible or explosible dust shall be of Type I or Type II construction in accordance with NFPA 220 and shall comply with the building code adopted by the AHJ.

Statement of Problem and Substantiation for Public Comment

It is essential that buildings handling combustible or explosible dust not be of combustible construction.

Related Item

- PI227

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 27 18:48:56 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The construction type was intentionally moved to the annex of this section based on the expanded scope of this document.



Public Comment No. 266-NFPA 660-2024 [Section No. 9.3.2.1]

9.3.2.1*

Each building or building compartment where a dust or particulate solid fire, building compartment flash fire, or building explosion hazard exists shall be protected from the consequence of fire, flash fire, or explosion.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new 9.3.2.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:17:17 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 267-NFPA 660-2024 [Section No. 9.3.2.2 [Excluding any Sub-Sections]]

If a building or building compartment ~~contains~~ has ~~a dust building explosion hazard outside of equipment , such areas they~~ shall be ~~provided with deflagration venting to a safe area~~ designed to vent the pressure, flames, and high temperatures to a safe location in accordance with NFPA 68.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38. In addition, the recommendation has be generalized to what the protection goal is and what standard it can be designed to. Using the term deflagration venting implies that only venting is needed but NFPA 68 would require venting and structural reinforcement of building elements.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 9.3.2.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:22:20 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 268-NFPA 660-2024 [Section No. 9.3.3.1]

9.3.3.1

Where a dust or particulate solid fire, building compartment flash fire, or building explosion hazard exists in a building or building compartment- ~~outside of equipment~~, building configuration and appurtenances shall comply with the life safety requirements of the building and fire prevention codes for a hazardous occupancy adopted by the AHJ.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 9.3.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:28:29 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 269-NFPA 660-2024 [Section No. 9.3.3.2]

9.3.3.2*

Where a ~~dust~~ building explosion hazard exists in a building or building compartment and an enclosed means of egress is provided, the egress enclosure shall be designed to withstand potential external overpressure from the explosion.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.3.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:31:25 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 270-NFPA 660-2024 [Section No. 9.3.5.1]

9.3.5.1

Areas where a dust or particulate solid fire, building compartment flash fire, or building explosion hazard exists in a building or building compartment (excluding hazards within equipment) shall be segregated, separated, or detached from other occupancies to minimize damage from a fire, flash fire, or explosion.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.5.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:33:45 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 271-NFPA 660-2024 [Section No. 9.3.5.2.3]

9.3.5.2.3

Where physical barriers, including all penetrations and openings of floors, walls, ceilings, or partitions, are erected to segregate ~~dust explosion~~ building explosion hazard areas, they shall be designed in accordance with NFPA 68 to preclude failure of those barriers during a dust explosion.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new Section 9.3.5.2.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:36:15 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 272-NFPA 660-2024 [Section No. 9.3.5.3.1]

9.3.5.3.1*

Separation shall be permitted to be used to limit the dust or particulate solid fire, building compartment flash fire, or building explosion hazard areas within a building when it is supported by a documented evaluation.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.5.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:38:12 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 206-NFPA 660-2024 [Section No. 9.3.5.3.2]****9.3.5.3.2***

The required separation distance between the dust or particulate solid fire, flash fire, or explosion hazard area and surrounding exposures shall be determined by an engineering evaluation that addresses the following:

- (1) Properties of the materials
- (2) Type of operation
- (3) Amount of material likely to be present outside the process equipment [including during abnormal or transient operations](#)
- (4) Building and equipment design
- (5) Nature of surrounding exposures

Statement of Problem and Substantiation for Public Comment

The DHA sections that are referred to by section 9.3.5 do not limit the review of hazards to only normal operations. Further, the determination of separation distance should consider the potential for unexpected accumulations of combustible dust. As discussed in section 7.3.4.2.2, threshold housekeeping accumulation limit includes non-routine dust accumulations, which would come from upset or transient conditions. Furthermore, appendix A.8.4.6.3 states, "One example of a transient release of dust is a temporary loss of containment..." which would indicate that facilities need to account for transient or upset conditions when designing separation distances rather than design for an assumption of all operations will only function in a normal state.

Related Item

- PI 203

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:10:49 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Accepted

Action:

Resolution: [SR-44-NFPA 660-2024](#)

Statement: The DHA sections that are referred to by section 9.3.5 do not limit the review of hazards to only normal operations. Further, the determination of separation distance should consider the potential for unexpected accumulations of combustible dust. As discussed in section 7.3.4.2.2, threshold housekeeping accumulation limit includes non-routine dust accumulations, which would come from upset or transient conditions. Furthermore, appendix A.8.4.6.3 states, "One example of a transient release of dust is a temporary loss of containment..." which would indicate that facilities need to account for transient or upset conditions when designing separation distances rather than design for an assumption of all operations will only function in a normal state.



Public Comment No. 273-NFPA 660-2024 [Section No. 9.3.5.3.2]

9.3.5.3.2*

The required separation distance between the dust or particulate solid fire, building compartment flash fire, or building explosion hazard area and surrounding exposures shall be determined by an engineering evaluation that addresses the following:

- (1) Properties of the materials
- (2) Type of operation
- (3) Amount of material likely to be present outside the process equipment
- (4) Building and equipment design
- (5) Nature of surrounding exposures

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.5.3.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:41:11 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 274-NFPA 660-2024 [Section No. 9.3.5.3.3]

9.3.5.3.3*

Where separation is used to limit the dust or particulate solid fire, building compartment flash fire, or building explosion hazard area determined in Chapter 7, the minimum separation distance shall not be less than 35 ft (11 m).

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.5.3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:43:03 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 275-NFPA 660-2024 [Section No. 9.3.5.3.6]

9.3.5.3.6*

Where separation is used, housekeeping, fixed dust collection systems employed at points of release, and the use of physical barriers shall be permitted to be used to limit the extent of the dust or particulate solid fire, building compartment flash fire, or building explosion hazard area.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.3.5.3.6	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:45:06 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 207-NFPA 660-2024 [Section No. 9.3.5.4.2]****9.3.5.4.2***

The required detachment distance between the dust flash fire or explosion hazard area and surrounding exposures shall be determined by a documented evaluation that addresses the following:

- (1) Properties of the materials
- (2) Type of operation
- (3) Amount of material likely to be present outside the process equipment [including during abnormal or transient operations](#)
- (4) Building and equipment design
- (5) Nature of surrounding exposures

Statement of Problem and Substantiation for Public Comment

The DHA sections that are referred to by section 9.3.5 do not limit the review of hazards to only normal operations. Further, the determination of separation distance should consider the potential for unexpected accumulations of combustible dust. As discussed in section 7.3.4.2.2, threshold housekeeping accumulation limit includes non-routine dust accumulations, which would come from upset or transient conditions. Furthermore, appendix A.8.4.6.3 states, "One example of a transient release of dust is a temporary loss of containment..." which would indicate that facilities need to account for transient or upset conditions when designing separation distances rather than design for an assumption of all operations will only function in a normal state.

Related Item

- PI 204

Submitter Information Verification

Submitter Full Name: Adam Henson

Organization: U.S. Chemical Safety Board

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jan 03 10:12:18 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Accepted

Action:

Resolution: [SR-45-NFPA 660-2024](#)

Statement: The DHA sections that are referred to by section 9.3.5 do not limit the review of hazards to only normal operations. Further, the determination of separation distance should consider the potential for unexpected accumulations of combustible dust. As discussed in section 7.3.4.2.2, threshold housekeeping accumulation limit includes non-routine dust accumulations, which would come from upset or transient conditions. Furthermore, appendix A.8.4.6.3 states, "One example of a transient release of dust is a temporary loss of containment..." which would indicate that facilities need to account for transient or upset conditions when designing separation distances rather than design for an assumption of all operations will only function in a normal state.



Public Comment No. 277-NFPA 660-2024 [Section No. 9.3.5.4.2]

9.3.5.4.2*

The required detachment distance between the dust- building compartment flash fire or building explosion hazard area and surrounding exposures shall be determined by a documented evaluation that addresses the following:

- (1) Properties of the materials
- (2) Type of operation
- (3) Amount of material likely to be present outside the process equipment
- (4) Building and equipment design
- (5) Nature of surrounding exposures

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new 9.3.5.4.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:47:30 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 59-NFPA 660-2023 [Section No. 9.4.3.1.1]****9.4.3.1.1***

Where used to handle combustible particulate solids, systems shall be designed by and installed under the supervision of qualified persons who are knowledgeable about these systems and their associated hazards.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._23.pdf	NFPA 660 CC Note No. 23	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 23 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-WOO: Consider moving 9.4.3.1.1 (supervision of qualified persons) to 9.4.1 to cover all equipment, not just pneumatic conveying, dust collection, and centralized vac. Then the Wood committee could get rid of 15.9.4.1.2 (which will be 14.9.4.1.2 after Chapter renumbering).

9.4.3.1.1*

Where used to handle combustible particulate solids, systems shall be designed by and installed under the supervision of qualified persons who are knowledgeable about these systems and their associated hazards.

A.9.4.3.1.1

The system information and documentation should include the following:

System design specifications
System installation specifications
Equipment specifications
Operational description
Material combustibility and explosibility information
Fire and explosion protection system specifications and design
System mechanical and electrical drawings
System controls and specifications

The design of these systems should be coordinated with the architectural and structural designs of the areas involved.

Related Item

- CC note 23

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Tue Dec 19 08:24:07 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-77-NFPA 660-2024](#)

Statement: Requirements are moving here from 9.4.3.1 so it will no longer be Reserved.

As identified by Correlating Committee Note 23, the requirements should apply to all equipment covered by 9.4, not just pneumatic conveying, dust collection, and centralized vacuum cleaning systems.



Correlating Committee Note No. 23-NFPA 660-2023 [Section No. 9.4.3.1.1]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 13:23:42 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-WOO: Consider moving 9.4.3.1.1 (supervision of qualified persons) to 9.4.1 to cover all equipment, not just pneumatic conveying, dust collection, and centralized vac. Then the Wood committee could get rid of 15.9.4.1.2 (which will be 14.9.4.1.2 after Chapter renumbering).

9.4.3.1.1*

Where used to handle combustible particulate solids, systems shall be designed by and installed under the supervision of qualified persons who are knowledgeable about these systems and their associated hazards.

A.9.4.3.1.1

The system information and documentation should include the following:

System design specifications

System installation specifications

Equipment specifications

Operational description

Material combustibility and explosibility information

Fire and explosion protection system specifications and design

System mechanical and electrical drawings

System controls and specifications

The design of these systems should be coordinated with the architectural and structural designs of the areas involved.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

15 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Aiken, Chris

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

**Public Comment No. 60-NFPA 660-2023 [Section No. 9.4.3.1.4]****9.4.3.1.4***

Equipment controlling the operation of the system shall be installed in a location where the operator is safe from the pressure and thermal effects of an explosion in the system.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._105.pdf	NFPA 660 CC Note No. 105	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 105 appeared in the First Draft Report on First Revisions No. 302 in NFPA 660.

Consider the following note from CMD-WOO: Consider adding annex language from A.15.9.4.4 (which will be A.14.9.4.4 after Chapter renumbering) to 9.4.3.1.4

A.15.9.4.4

NFPA 68 provides equations for calculating the distance needed when using distance to achieve the safe location required by 9.4.4.1.

[9.4.4.1 was moved to 9.4.3.1.4 at the First Draft TC stage]

Related Item

- FR No. 302

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:32:27 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: This is already covered by A.9.4.3.1.4(2).



Correlating Committee Note No. 105-NFPA 660-2023 [Section No. 9.4.3.1.4]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:30:01 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-WOO: Consider adding annex language from A.15.9.4.4 (which will be A.14.9.4.4 after Chapter renumbering) to 9.4.3.1.4

A.15.9.4.4

NFPA 68 provides equations for calculating the distance needed when using distance to achieve the safe location required by 9.4.4.1.

[9.4.4.1 was moved to 9.4.3.1.4 at the First Draft TC stage]

FR-98-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok



Public Comment No. 278-NFPA 660-2024 [Section No. 9.4.3.2.3]

9.4.3.2.3*

Pneumatic conveying systems conveying combustible particulate solids and posing an equipment explosion hazard shall be protected in accordance with Section 9.8.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification it to new 9.4.3.2.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:49:18 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 279-NFPA 660-2024 [Section No. 9.4.3.3.5]

9.4.3.3.5*

Dust collection systems that remove material from operations that could generate flames, sparks, or hot material under normal operating conditions shall provide a means to prevent propagation of these flames, sparks, or hot materials to the AMS or creation of a fire or equipment explosion hazard within the ductwork.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.3.3.5	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:50:47 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 61-NFPA 660-2023 [Section No. 9.4.4.1]****9.4.4.1** General.**9.4.4.1.1** Collected Material Discharge.

The discharge conveying system shall be designed to handle the maximum material flow separated from the air stream.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No_98.pdf	NFPA 660 CC Note No. 98	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 98 appeared in the First Draft Report on First Revisions No. 224 in NFPA 660.

Consider the following note from CMD-HAP: Move 13.9.4.4.1.1 (which will be 15.9.4.4.1.1 after Chapter renumbering) to Chapter 9.

13.9.4.4.1.1*

Controls shall be provided to prevent excessive accumulation in the AMS.

A.13.9.4.4.1.1

The AMS should not be used as a combustible dust storage device due to the potential of bridging filling the unit to the point it will not function, possible inhibiting of the material discharge due to bridging and plugging of the discharge and possible self-heating of some type of dusts. In addition, overfilling can interfere with the function of explosion prevention/protection equipment. A rotary airlock valve or a rotary airlock valve and screw conveyor combination can be used to provide for continuous discharge of the separated dusts; alternatively, a slide valve can be used where dust loadings are light, provided that the material is removed frequently enough to prevent bridging and plugging. The container below the rotary valve or other continuous discharge device should be designed for the type of material collected and the typical rates of material collected and to minimize the creation of aerated dusts during the discharge of the material from the AMS into the container. It is also important to maintain regular emptying or replacement of the collected material container to minimize the risk of overfilling.

Related Item

• FR No. 224

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Tue Dec 19 08:52:17 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-47-NFPA 660-2024](#)

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 98-NFPA 660-2023 [Section No. 9.4.4.1]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 13:55:04 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Move 13.9.4.4.1.1 (which will be 15.9.4.4.1.1 after Chapter renumbering) to Chapter 9.

13.9.4.4.1.1*

Controls shall be provided to prevent excessive accumulation in the AMS.

A.13.9.4.4.1.1

The AMS should not be used as a combustible dust storage device due to the potential of bridging filling the unit to the point it will not function, possible inhibiting of the material discharge due to bridging and plugging of the discharge and possible self-heating of some type of dusts. In addition, overfilling can interfere with the function of explosion prevention/protection equipment. A rotary airlock valve or a rotary airlock valve and screw conveyor combination can be used to provide for continuous discharge of the separated dusts; alternatively, a slide valve can be used where dust loadings are light, provided that the material is removed frequently enough to prevent bridging and plugging. The container below the rotary valve or other continuous discharge device should be designed for the type of material collected and the typical rates of material collected and to minimize the creation of aerated dusts during the discharge of the material from the AMS into the container. It is also important to maintain regular emptying or replacement of the collected material container to minimize the risk of overfilling.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 281-NFPA 660-2024 [Section No. 9.4.4.3]

9.4.4.3* Dry AMS.

Where an equipment explosion hazard exists, AMSs with a dirty side volume of the air-material separator is greater than 8 ft³ (0.2 m³), or greater shall be protected in accordance with Section 9.8.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.4.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:52:23 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 282-NFPA 660-2024 [Section No. 9.4.4.6.1]

9.4.4.6.1

Where an equipment explosion hazard exists, AMSs with a dirty-side volume of 8 ft³ (0.2 m³) or greater shall be located outside of buildings.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.4.6.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:53:38 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 62-NFPA 660-2023 [Section No. 9.4.4.7.2]****9.4.4.7.2***

Air from AMSs shall be permitted to be recirculated directly back to the pneumatic conveying system.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._99.pdf	NFPA 660 CC Note No. 99	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 99 appeared in the First Draft Report on First Revisions No. in 241 NFPA 660.

Consider the following note from CMD-HAP: Recommend that 9.4.4.7.2 say "conveying gas" rather than "air" as in 14.9.4.4.7 (which will be 13.9.4.4.7 after Chapter renumbering).

Related Item

- FR No. 241

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 08:58:33 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-48-NFPA 660-2024](#)

Statement: "Air/gas" is the terminology used elsewhere in the standard.



Correlating Committee Note No. 99-NFPA 660-2023 [Section No. 9.4.4.7.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 15:54:00 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Recommend that 9.4.4.7.2 say "conveying gas" rather than "air" as in 14.9.4.4.7 (which will be 13.9.4.4.7 after Chapter renumbering).

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 142-NFPA 660-2024 [Section No. 9.4.4.7.3]****9.4.4.7.3***

Recycling of AMS exhaust to buildings or building compartments shall be permitted when all the following conditions are met:

- (1) Gases or vapors are not present in either the intake or the recycled air in concentrations above applicable industrial hygiene exposure limits or 1 percent of the lower flammable limit (LFL), whichever is lower.
- (2)* Combustible particulate solids are not present in the recycled air in concentrations above applicable industrial hygiene exposure limits or 1 percent of the minimum explosible concentration (MEC), whichever is lower.
- (3)* The oxygen concentration of the recycled air stream is between 19.5 percent and 23.5 percent by volume.
- (4) Provisions are incorporated to prevent transmission of flame and pressure effects from a deflagration in an AMS back to the facility unless a DHA- risk assessment indicates that those effects do not pose a threat to the facility or the occupants.
- (5) Provisions are incorporated to prevent transmission of smoke and flame from a fire in an AMS back to the facility unless a ~~DHA indicates~~ risk assessment indicates that those effects do not pose a threat to the facility or the occupants.
- (6) The system includes a method for detecting AMS malfunctions that would reduce collection efficiency and allow increases in the amount of combustible particulate solids returned to the building.
- (7) The building or building compartment to which the recycled air is returned meets the housekeeping requirements of 8.4.6.
- (8) Recycled-air ducts are inspected at least annually and cleaned if dust accumulations are present.

Statement of Problem and Substantiation for Public Comment

As written, the application of these controls is more of a risk based assessment rather than a hazard analysis.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:23:41 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-49-NFPA 660-2024

Statement: As written, the application of these controls is more of a risk based assessment rather than a hazard analysis.



Public Comment No. 283-NFPA 660-2024 [Section No. 9.4.5.2]

9.4.5.2*

Where an equipment explosion hazard exists, systems shall be designed in such a manner that combustible particulate solids do not pass through an AMD.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new 9.4.5.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:54:51 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 286-NFPA 660-2024 [Section No. 9.4.6.3]

9.4.6.3*

When ducts pass through a physical barrier erected to segregate dust or particulate solid fire, building compartment flash fire, or building explosion hazards, physical isolation protection shall be provided to prevent propagation of fire, flash fire, or explosions between segregated spaces.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new 9.4.6.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:56:45 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 287-NFPA 660-2024 [Section No. 9.4.9.3.1]

9.4.9.3.1

Where an equipment explosion hazard exists as determined by a DHA, fixed bulk storage enclosures shall be located outside of buildings.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This modification is to new 9.4.9.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:58:47 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 145-NFPA 660-2024 [Sections 9.4.9.3.1, 9.4.9.3.2]****Sections 9.4.9.3.1, 9.4.9.3.2****9.4.9.3.1**

Where an explosion hazard exists ~~as determined by a DHA~~, fixed bulk storage enclosures shall be located outside of buildings.

9.4.9.3.2

Fixed bulk storage enclosures with explosion hazards ~~as determined by a DHA~~ shall be permitted to be located inside buildings where one of the following applies:

- (1) Fixed bulk storage enclosures are protected in accordance with 9.8.2.
- (2)* Fixed bulk storage enclosures are less than 8 ft³ (0.2 m³).

Statement of Problem and Substantiation for Public Comment

The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:34:47 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: SR-50-NFPA 660-2024

Statement: The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements.



Public Comment No. 289-NFPA 660-2024 [Section No. 9.4.9.3.2]

9.4.9.3.2

Fixed bulk storage enclosures with equipment explosion hazards as determined by a DHA shall be permitted to be located inside buildings where one of the following applies:

- (1) Fixed bulk storage enclosures are protected in accordance with 9.8.2.
- (2)* Fixed bulk storage enclosures are less than 8 ft³ (0.2 m³).

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definition in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.9.3.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:59:56 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 290-NFPA 660-2024 [Section No. 9.4.10]

9.4.10* Size Reduction.

Where a fire or equipment explosion hazard would otherwise result, before material is processed by size reduction equipment, foreign materials shall be excluded or removed as required by 9.6.11.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.10	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:01:36 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 291-NFPA 660-2024 [Section No. 9.4.12.2.4]

9.4.12.2.4*

Pressure relief devices shall not be vented to an area where a dust or particulate solid fire, building compartment flash fire, or building explosion hazard exists in accordance with 7.3.4.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new 9.4.12.2.4	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:03:05 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 144-NFPA 660-2024 [Section No. 9.4.17.1.1.1]****9.4.17.1.1.1***

Recycling of exhaust from a dryer system to buildings or building compartments shall be permitted when all the following conditions are met:

- (1) Gases or vapors are not present in either the intake or the recycled air in concentrations above applicable industrial hygiene exposure limits or 1 percent of the LFL, whichever is lower.
- (2)* Combustible particulate solids are not present in the recycled air in concentrations above applicable industrial hygiene exposure limits or 1 percent of the MEC, whichever is lower.
- (3)* The oxygen concentration of the recycled air stream is between 19.5 percent and 23.5 percent by volume.
- (4) Provisions are incorporated to prevent transmission of flame and pressure effects from a deflagration in a dryer system back to the facility unless a DHA- risk assessment indicates that those effects do not pose a threat to the facility or the occupants.
- (5) Provisions are incorporated to prevent transmission of smoke and flame from a fire in a dryer system back to the facility unless a DHA- risk assessment indicates that those effects do not pose a threat to the facility or the occupants.
- (6) The system includes a method for detecting and mitigating dryer system malfunctions that would allow increases in the amount of combustible particulate solids returned to the building.
- (7) The building or building compartment to which the recycled air is returned meets the housekeeping requirements of 8.4.6.
- (8) Recycled-air ducts are inspected at least annually and cleaned if dust accumulations are present.

Statement of Problem and Substantiation for Public Comment

As written, the application of these controls is more of a risk based assessment rather than a hazard analysis.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:32:20 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-51-NFPA 660-2024

Statement: As written, the application of these controls is more of a risk based assessment rather than a hazard analysis.

**Public Comment No. 147-NFPA 660-2024 [Section No. 9.4.17.1.2]****9.4.17.1.2***

~~Where a DHA has determined a~~ Where a combustible dust hazard exists in the dryer or recycled air stream during the drying process, those hazards shall be controlled.

Statement of Problem and Substantiation for Public Comment

The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements. This section may also not be needed since 9.4.17.1.1 already includes requirements for the control of combustible dust hazards.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:41:04 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: [SR-52-NFPA 660-2024](#)

Statement: The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements.

**Public Comment No. 148-NFPA 660-2024 [Section No. 9.4.17.1.4.1]****9.4.17.1.4.1***

Dryer cleaning methods, frequency, and the required level of ~~cleanliness as determined by the DHA shall~~ cleanliness shall be documented.

Statement of Problem and Substantiation for Public Comment

The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements. Determining the required level of cleanliness is also not part of the DHA.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:45:07 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: [SR-53-NFPA 660-2024](#)

Statement: The phrase "a DHA has determined" is unnecessary for the specified requirements and is somewhat redundant. This phrase is not needed since a hazard either exists or does not and the phrase does not add anything to the requirements.



Public Comment No. 293-NFPA 660-2024 [Section No. 9.5.3.9]

9.5.3.9

These systems shall not be used where they can relocate dust into unsealed concealed spaces where the dust can accumulate and pose a fire, building compartment flash fire, or building explosion hazard.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• Modification to new 9.5.3.9	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:05:00 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 294-NFPA 660-2024 [Section No. 9.6.3.2]

9.6.3.2*

In areas where a dust- building_ explosion hazard or dust- building compartment_ flash fire hazard exists, the temperature of external surfaces, such as compressors; steam, water, or process piping; ducts; and process equipment shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust surface ignition temperature or the dust-cloud ignition temperature.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modification to new 9.6.3.2	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:07:13 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 63-NFPA 660-2023 [Section No. 9.6.3.2]****9.6.3.2***

In areas where a dust explosion hazard or dust flash fire hazard exists, the temperature of external surfaces, such as compressors; steam, water, or process piping; ducts; and process equipment shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust surface ignition temperature or the dust-cloud ignition temperature.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._101.pdf	NFPA 660 CC Note No. 101	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 101 appeared in the First Draft Report on First Revisions No. 145 and 270 in NFPA 660.

Consider the following note from CMD-HAP: Recommend that fundamentals adopt A.13.9.6.3 (which will be A.15.9.6.3 after Chapter renumbering) in relation to 9.6.3.2 temperature of external surfaces:

A.13.9.6.3 This section does not apply to electrical equipment; that topic is addressed in 13.9.6.14. Dust layer and dust cloud ignition temperatures should be determined by ASTM E2021, Standard Test Method for Hot-Surface Ignition Temperature of Dust Layers; ASTM

E1491, Standard Test Method for Minimum Autoignition Temperature of Dust Clouds; or other recognized test methods acceptable to the AHJ. Normally the minimum ignition temperature of a layer of a specific dust is lower than the minimum ignition temperature of a cloud of that dust; however, this is not universally true (see NFPA 499). The minimum ignition temperature typically decreases with increasing layer thickness, and testing up to maximum layer thickness to be expected on external surfaces is recommended.

The ignition temperature of a layer of dust on hot surfaces could decrease over time if the dust dehydrates or carbonizes. For organic dusts that can dehydrate or carbonize, the temperature should not exceed the lower of the ignition temperature or 329°F (165°C). The ignition temperatures for many materials are shown in NFPA 499.

Related Item

- FR No. 145 and 270

Submitter Information Verification**Submitter Full Name:**

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Tue Dec 19 10:39:24 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-54-NFPA 660-2024

Statement: Text from Chapter 14 and Chapter 15 was incorporated with the existing text as it has been deemed fundamental.



Correlating Committee Note No. 101-NFPA 660-2023 [Section No. 9.6.3.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:18:26 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Recommend that fundamentals adopt A.13.9.6.3 (which will be A.15.9.6.3 after Chapter renumbering) in relation to 9.6.3.2 temperature of external surfaces:

A.13.9.6.3 This section does not apply to electrical equipment; that topic is addressed in 13.9.6.14. Dust layer and dust cloud ignition temperatures should be determined by ASTM E2021, Standard Test Method for Hot-Surface Ignition Temperature of Dust Layers; ASTM E1491, Standard Test Method for Minimum Autoignition Temperature of Dust Clouds; or other recognized test methods acceptable to the AHJ. Normally the minimum ignition temperature of a layer of a specific dust is lower than the minimum ignition temperature of a cloud of that dust; however, this is not universally true (see NFPA 499). The minimum ignition temperature typically decreases with increasing layer thickness, and testing up to maximum layer thickness to be expected on external surfaces is recommended.

The ignition temperature of a layer of dust on hot surfaces could decrease over time if the dust dehydrates or carbonizes. For organic dusts that can dehydrate or carbonize, the temperature should not exceed the lower of the ignition temperature or 329°F (165°C). The ignition temperatures for many materials are shown in NFPA 499.

FR-145-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.
Creswell, Gregory F.
Edwards, Brian
Frank, Walter L.
Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 64-NFPA 660-2023 [Section No. 9.6.3.2]****9.6.3.2***

In areas where a dust explosion hazard or dust flash fire hazard exists, the temperature of external surfaces, such as compressors; steam, water, or process piping; ducts; and process equipment shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust surface ignition temperature or the dust-cloud ignition temperature.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._104.pdf	NFPA 660 CC Note No. 104	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 104 appeared in the First Draft Report on First Revisions No. 145 and 294 in NFPA 660.

Consider the following note from CMD-WOO: Review language in 15.9.6.3.1 (which will be 14.9.6.3.1 after Chapter renumbering) and make those changes in fundamentals 9.6.3.2. Also adopt annex.

15.9.6.3.1*

In areas where a dust explosion, building compartment deflagration, or dust flash fire hazard exists, the temperature of exposed surfaces shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust layer ignition temperature or the dust-cloud ignition temperature.

A.15.9.6.3.1

Fire losses have occurred where steam piping was identified as the ignition source for wood dust deposits. This is possible because prolonged exposure to elevated temperatures will cause the decrepitation of the cellulose into pyrolysis products that can have lower ignition temperatures than those normally associated with wood. In permitting maximum surface temperatures above 100°C (212°F) (the minimum steam temperature), it is assumed that appropriate personnel safety measures are in place and that a rigid housekeeping program exists to keep dust accumulations under control. Equipment surfaces in hard-to-access locations that will collect dust and are likely to be cleaned less frequently should be insulated to keep the maximum surface temperature below 100°C (212°F).

Dust layer and dust cloud ignition temperatures should be determined by ASTM E2021, Test Method for Hot-Surface Ignition Temperature of Dust Layers; ASTM E1491, Test Method for Minimum Autoignition Temperature of Dust Clouds; or other recognized test methods acceptable to the AHJ. Normally, the minimum ignition temperature of a layer of a specific dust is lower than the minimum ignition temperature of a cloud of that dust; however, this is not universally true (see NFPA 499). The minimum ignition temperature typically decreases with increasing layer thickness, and testing up to maximum layer thickness to be expected on external surfaces is recommended.

The ignition temperature of a layer of dust on hot surfaces could decrease over time if the dust dehydrates or carbonizes. The ignition temperatures for many materials are shown in NFPA 499.

Related Item

- FR No. 145 and 294

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submission Date: Tue Dec 19 10:43:23 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-54-NFPA 660-2024

Statement:

Text from Chapter 14 and Chapter 15 was incorporated with the existing text as it has been deemed fundamental.



Correlating Committee Note No. 104-NFPA 660-2023 [Section No. 9.6.3.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:23:46 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-WOO: Review language in 15.9.6.3.1 (which will be 14.9.6.3.1 after Chapter renumbering) and make those changes in fundamentals 9.6.3.2. Also adopt annex.

15.9.6.3.1*

In areas where a dust explosion, building compartment deflagration, or dust flash fire hazard exists, the temperature of exposed surfaces shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust layer ignition temperature or the dust-cloud ignition temperature.

A.15.9.6.3.1

Fire losses have occurred where steam piping was identified as the ignition source for wood dust deposits. This is possible because prolonged exposure to elevated temperatures will cause the decrepitation of the cellulose into pyrolysis products that can have lower ignition temperatures than those normally associated with wood. In permitting maximum surface temperatures above 100°C (212°F) (the minimum steam temperature), it is assumed that appropriate personnel safety measures are in place and that a rigid housekeeping program exists to keep dust accumulations under control. Equipment surfaces in hard-to-access locations that will collect dust and are likely to be cleaned less frequently should be insulated to keep the maximum surface temperature below 100°C (212°F).

Dust layer and dust cloud ignition temperatures should be determined by ASTM E2021, Test Method for Hot-Surface Ignition Temperature of Dust Layers; ASTM E1491, Test Method for Minimum Autoignition Temperature of Dust Clouds; or other recognized test methods acceptable to the AHJ. Normally, the minimum ignition temperature of a layer of a specific dust is lower than the minimum ignition temperature of a cloud of that dust; however, this is not universally true (see NFPA 499). The minimum ignition temperature typically decreases with increasing layer thickness, and testing up to maximum layer thickness to be expected on external surfaces is recommended.

The ignition temperature of a layer of dust on hot surfaces could decrease over time if the dust dehydrates or carbonizes. The ignition temperatures for many materials are shown in NFPA 499.

FR-145-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

13 Affirmative All

- 2 Affirmative with Comments
- 0 Negative with Comments
- 0 Abstention

Not Returned

Davis, Scott G.
Krbec, Jason
Kreitman, Kevin

Affirmative All

Cholin, John M.
Creswell, Gregory F.
Edwards, Brian
Frank, Walter L.
Kimbell, Kevin
LaPine, Edward R.
LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

Bujewski, Matthew J.

I agree with the concept, but this would be tough to enforce or even measure for some processes.

**Public Comment No. 150-NFPA 660-2024 [Section No. 9.6.7.6]****9.6.7.6**

In facility locations that have been identified in the DHA as being dust flash fire or explosion hazard areas or hazardous (classified) locations, heating units shall be provided with a source of combustion air ducted directly from the building exterior or from an unclassified location.

Statement of Problem and Substantiation for Public Comment

The phrase "in the DHA" is unnecessary for the specified requirements and is redundant.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:47:18 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: SR-55-NFPA 660-2024

Statement: The phrase "in the DHA" is unnecessary for the specified requirements and is redundant.



Public Comment No. 295-NFPA 660-2024 [Section No. 9.6.7.6]

9.6.7.6

In facility locations that have been identified in the DHA as being dust- building compartment flash fire or building explosion hazard areas or hazardous (classified) locations, heating units shall be provided with a source of combustion air ducted directly from the building exterior or from an unclassified location.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.6.7.6	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:09:47 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 65-NFPA 660-2023 [Section No. 9.6.8]****9.6.8 Industrial Trucks.****9.6.8.1**

Industrial trucks shall be listed or approved for the electrical classification of the area, as determined by 9.6.5, and shall be used in accordance with NFPA 505.

9.6.8.2*

Where industrial trucks in accordance with NFPA 505 are not commercially available, a documented risk assessment in accordance with Section 9.2 shall be permitted to be used to specify the fire and explosion prevention features for the equipment being used.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._95.pdf	NFPA 660 CC Note No. 95	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 95 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-HAP: Add annex material regarding the hazard of frictional sparks from metal on concrete - not specific to hazardous (classified) locations as in A.9.6.8.2 but somewhere in A.9.6.8

Related Item

- CC Note 95

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 10:48:49 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The CMD-FUN committee does not see the need to add annex material on this topic at this time. The CMD-HAP committee should provide specific language if they would like this addressed in A.9.



Correlating Committee Note No. 95-NFPA 660-2023 [Section No. 9.6.8]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 13:34:57 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add annex material regarding the hazard of frictional sparks from metal on concrete - not specific to hazardous (classified) locations as in A.9.6.8.2 but somewhere in A.9.6.8

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 152-NFPA 660-2024 [Section No. 9.6.9.1]****9.6.9.1***

Heated process equipment containing combustible dust shall have operating controls arranged to maintain the temperature of equipment interiors within the prescribed limits as ~~determined~~- documented by the DHA.

Statement of Problem and Substantiation for Public Comment

"Determined" should be changed to "documented" by the DHA for better clarity and application of the phrase. The word "documented" also still allows for the determination of hazards, but does not control the design and limits specified in the requirements.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:50:23 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: [SR-57-NFPA 660-2024](#)

Statement: "Determined" should be changed to "documented" by the DHA for better clarity and application of the phrase. The word "documented" also still allows for the determination of hazards, but does not control the design and limits specified in the requirements.



Public Comment No. 296-NFPA 660-2024 [Section No. 9.6.11.3]

9.6.11.3*

Where introduction of tramp materials cannot be prevented, explosion protection shall be provided for all equipment subject to ~~the explosion-~~ an equipment explosion hazard.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.6.11.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:11:51 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 66-NFPA 660-2023 [Section No. 9.6.13]****9.6.13 Smoking and Vaping.**

Where smoking and vaping is permitted in the facility, it shall be restricted to designated nonhazardous areas equipped with devices for smoking material disposal and free of combustible/flammable hazards or storage.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._108.pdf	NFPA 660 CC Note No. 108	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 108 appeared in the First Draft Report on First Revisions No. 134 in NFPA 660.

Consider the following note from CMD-AGR: In 9.6.13 for Smoking/Vaping, add annex that was previously included in A.11.9.5.13: "NO SMOKING" signs should be posted.

Related Item

- FR No. 134

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 10:51:37 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-58-NFPA 660-2024](#)

Statement: A statement about "NO SMOKING" signs was previously included in an industry-specific chapter and has been deemed fundamental. This has been reworded for clarity.



Correlating Committee Note No. 108-NFPA 660-2023 [Section No. 9.6.13]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:35:33 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-AGR: In 9.6.13 for Smoking/Vaping, add annex that was previously included in A.11.9.5.13: "NO SMOKING" signs should be posted.

FR-134-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok



Public Comment No. 297-NFPA 660-2024 [Section No. 9.8.1]

9.8.1 General.

Where a ~~dust~~ building or equipment explosion hazard exists within an enclosure, measures shall be taken as specified in Section 9.8 to protect personnel from the consequences of an explosion in that enclosure.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.8.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:13:11 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 67-NFPA 660-2023 [Section No. 9.8.2]****9.8.2** Equipment Protection.**9.8.2.1*** General.

Where an explosion hazard exists within any operating equipment greater than 8 ft³ (0.2 m³) of containing volume, the equipment shall be protected from the effects of an explosion.

9.8.2.2*

Explosion protection systems shall incorporate one or more of the following methods of protection:

- (1) Oxidant concentration reduction in accordance with NFPA 69
- (2) Deflagration venting in accordance with NFPA 68
- (3) Deflagration venting through listed flame-arresting devices in accordance with NFPA 68
- (4) Deflagration pressure containment in accordance with NFPA 69
- (5) Deflagration suppression system in accordance with NFPA 69
- (6) Dilution with a noncombustible dust to render the mixture noncombustible

9.8.2.3

Enclosures and all interconnections protected in accordance with 9.8.2.2 shall be designed to withstand the resultant pressures produced during the deflagration event.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._96.pdf	NFPA 660 CC Note No. 96	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 96 appeared in the First Draft Report on First Revisions No. 176 in NFPA 660.

Consider the following note from CMD-HAP: Add the following statement to 9.8.2 Equipment Protection: Where both an explosion hazard and a fire hazard exist in an AMS, protection for each type of hazard shall be provided.

Related Item

- FR No 172

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Tue Dec 19 10:55:44 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-59-NFPA 660-2024

Statement: This was previously included in an industry-specific chapter and has been deemed fundamental.



Correlating Committee Note No. 96-NFPA 660-2023 [Section No. 9.8.2]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 13:50:54 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add the following statement to 9.8.2 Equipment Protection: Where both an explosion hazard and a fire hazard exist in an AMS, protection for each type of hazard shall be provided.

FR-172-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 299-NFPA 660-2024 [Section No. 9.8.2.1]

9.8.2.1* General.

Where an equipment explosion hazard exists within any operating equipment greater than 8 ft³ (0.2 m³) of containing volume, the equipment shall be protected from the effects of an explosion.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.8.2.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:14:23 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 303-NFPA 660-2024 [Section No. 9.8.3.1]

9.8.3.1

Where ~~a dust explosion~~ an equipment explosion hazard exists, isolation devices shall be provided in accordance with NFPA 69 to prevent propagation of flames and pressure between connected equipment.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.8.3.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:18:44 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 304-NFPA 660-2024 [Section No. 9.8.3.3]

9.8.3.3

Where ~~a dust explosion~~ an equipment explosion hazard exists, isolation devices shall be provided in accordance with NFPA 69 to prevent propagation of flames and pressure from equipment through ductwork to the work areas.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new 9.8.3.3	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:19:44 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 153-NFPA 660-2024 [Section No. 9.9.5.2]****9.9.5.2***

Automatic sprinkler protection shall not be permitted in areas where water-reactive combustible metals or water-reactive materials are produced or handled unless permitted by a risk assessment- ~~as part of the DHA~~ .

Statement of Problem and Substantiation for Public Comment

The phrase "as part of a DHA" is unnecessary and adds confusion since a risk assessment and DHA are two distinct processes.

This was submitted on behalf of the Task Group on DHAs.

Related Item

- DHA Task Group - CCN 26

Submitter Information Verification

Submitter Full Name: Jason Reason

Organization: Airdusco, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jan 01 10:52:32 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Accepted

Resolution: SR-60-NFPA 660-2024

Statement: The phrase "as part of a DHA" is unnecessary and adds confusion since a risk assessment and DHA are two distinct processes.



Public Comment No. 225-NFPA 660-2024 [Chapter 10]

Chapter

10 – Reserved

10.1 –

10 Emergency Planning and Manual Firefighting

10.1 Emergency Planning & Response

10.2.1 A written emergency response plan shall be developed for preparing for and responding to work-related emergencies including, but not limited to, fires, flash fires, and explosions.

10.2.2 Emergency planning and response shall be in accordance with NFPA 600, Standard on Facility Fire Brigades (if applicable), and NFPA 1660, Standard on Continuity, Emergency, and Crisis Management.

10.2.3 The emergency response plan shall include, but not be limited to, the following:

10.2.3.1 A means of notification for occupants in the event of fire and explosion

10.2.3.2 A preplanned evacuation assembly area

10.2.3.3 A person(s) designated to notify emergency responders, including the fire department

10.2.3.4 A facility layout drawing(s) showing egress routes, hazardous chemical locations, and fire protection equipment

10.2.3.5 Location of a safety data sheet(s) for hazardous chemicals

10.2.3.6 Plant management emergency telephone number(s).

10.2.3.7 Emergency response duties for occupants

10.2.3.8 A person(s) designated to meet the offsite emergency responder(s) to coordinate the incident

10.2.3.9 Interdepartmental and interplant cooperation

10.2.3.10 Cooperation of outside agencies

10.2.3.11 The release of accurate information to the public

10.2.4 The emergency response plan shall address locations for remote shutoff of supply systems when any of the following are present:

10.2.4.1 Water (water from all types of sources)

10.2.4.2 Electrical materials

10.2.4.3 Flammable gases

10.2.4.4 Ignitable (flammable or combustible) liquids

10.2.4.5 Toxic materials

10.2.4.6 Other hazardous materials

10.3 Emergency Response Plan and Training

10.3.1 Employee health and safety in operations shall depend on the recognition of actual or potential hazards, the control or elimination of those hazards, and the training of employees on safe working procedures.

10.3.2 The emergency response plan shall be available on-site or electronically.

10.3.3 Fires, when discovered, shall be reported promptly to facility management and emergency responders, including the fire department.

10.3.4 If a fire cannot be controlled promptly in its incipient stage, the endangered structure(s) shall be evacuated.

10.3.5 Emergency drills shall be performed annually by plant personnel and validated as required by process changes.

10.3.6 Plant personnel, including management, supervisors, and maintenance and operating personnel, shall be trained to participate in plans for controlling plant emergencies.

10.3.7 The emergency response plan shall be shared with relevant local community officials and emergency response agencies.

10.3.8 Malfunctions of the process shall be simulated and emergency actions undertaken as necessary.

10.3.9 Disaster drills that simulate a major catastrophic situation shall be undertaken periodically with the cooperation and participation of public fire, police, and other local community emergency units and nearby cooperating plants.

10.3.10 Specialized training for the public fire department(s) and industrial fire brigades shall be warranted when the facility-specific hazards dictate that the methods to control and extinguish a fire are outside of their normal arena of traditional firefighting.

10.4 Manual Firefighting

10.4.1 Those individuals responsible for manual fire suppression shall have a fire protection plan.

10.4.2 Proper protective clothing, respiratory protection, and adequate eye protection shall be used by all responding firefighting

personnel assigned to a combustible metal fire equipped to the requirements of NFPA 600, Standard on Facility Fire Brigades (if applicable) or NFPA 1081, Standard for Facility Fire Brigade Member Professional Qualifications.

10.4.3 The evaluation of the risk to facility personnel and firefighters shall be made based on discussions with the responding fire department(s) and review of the DHA.

10.4.4 The potential effectiveness of manual firefighting shall be assessed by experienced firefighting personnel after reviewing the hazard assessment documentation developed in accordance with the DHA.

10.4.5 For materials that can be effectively extinguished with water, hose streams shall be used with great care to avoid creating dust clouds or causing structural damage to bins.

10.4.5.1 Straight stream nozzles shall not be used on fires in areas where dust clouds can be generated.

10.4.5.2 Fire responders shall be cautioned when using straight stream nozzles in the vicinity of combustible dust accumulations that dust clouds can be formed and can be ignited by any residual smoldering or fire.

10.4.5.3 Straight stream nozzles or combination nozzles shall be permitted to be used to reach fires in locations that are otherwise inaccessible with the nozzles specified in 11.8.10.3.5.

10.4.5.4 Fog nozzles or Portable spray hose nozzles that are listed or approved for use on Class C fires shall be provided in areas that contain dust, to limit the potential for generating unnecessary airborne dust during firefighting operations.

10.4.6 Where firefighting water or wet product can accumulate in the system, the vessel, pipe supports, and drains shall be designed to support the additional water weight in accordance with NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists and Particulate Solids.

10.5 Firefighting Operations / Activities

10.5.1 Incipient firefighting techniques shall be established for fighting different types of fires that may be present at a facility including:

10.5.2 Clothing Fires.

10.5.2.1 Emergency procedures for handling clothing fires shall be established as part of the plan.

10.5.2.2 If deluge showers are installed, they shall be located away from dry metal powder—processing and metal powder—handling areas if water is not an effective extinguishing agent.

10.5.2.3 The plan shall address locations for remote shutoff of supply systems when any of the following are present:

- Water (water from all types of sources)
- Electrical materials
- Flammable gases
- Ignitable (flammable or combustible) liquids
- Toxic materials
- Other hazardous materials

10.5.2.4 In plant areas where water is excluded, fire blankets shall be distributed for extinguishing clothing fires.

10.5.2.5 Elevator leg fires

10.5.2.5.1 Burning material shall not be transferred into legs.

10.5.2.6 Conveyor belt fires

10.5.2.7 Dryer fires

10.5.2.8 Concrete bin or silo and steel tank fires

10.5.2.9 Concrete Bin or Silo and Steel Tank Smolders

10.5.2.10 Fumigant or Chemical Fires

10.5.2.11 Water Gas Reaction

10.5.2.12 Bearing Fires

10.5.2.12.1 Bearing fires shall be extinguished with a gentle application of water fog onto the bearing for cooling.

10.5.2.12.2 If water is not available, other means of extinguishment shall be permitted to be used on the bearing fire, provided caution is taken to avoid the suspension of combustible dust.

10.5.2.12.3 If the bearing is located inside equipment, material flow shall be stopped, equipment shall be shut down, and extreme caution shall be used when equipment is opened.

10.6 Agricultural and Food Processing

10.7 Combustible Metals

10.7.1 Local emergency response agency notification shall be required for any operation storing or processing 5 lb (2.27 kg) or more of powder, dusts, fines, or alkali metal in any form or 500 lb (227 kg) or more of chips or turnings.

10.7.2 The following list of actions to be performed as well as information regarding the hazards of combustible metals shall be provided to emergency responders for the safe handling of combustible metal fires:

10.7.2.1 Perform a size-up, evaluation, and identification of metals involved in the fire.

10.7.2.2 Ensure control of utilities (e.g., water, gases, power, etc.) to affected areas.

10.7.2.3 Review safety data sheets (SDSs) for the involved products, and if available, contact those familiar with the product and hazards.

10.7.2.4 Evaluate whether the fire can be isolated safely and allowed to burn out.

10.7.2.5 Determine whether uninvolved product and exposures — other than alkali metals — can be protected by hose streams, after an adequate review has been completed to ensure any runoff from hose streams does not come into contact with burning or molten combustible metal.

10.7.2.6 Do not apply water to alkali metals in either a fire or non-fire situation.

10.7.2.7 Use an inert blanket, such as argon, helium, or nitrogen, if the fire is burning in a closed container, such as a dust collection system, to control the fire where an adequate delivery system is available and personnel safety is considered.

10.7.2.8 Evaluate the potential for explosion.

10.7.2.9 Use extreme caution with fires involving combustible-metal powders, dusts, and fines because of the possibility of explosions, especially if the product becomes airborne and there is an available ignition source.

10.7.2.10 Evaluate whether there is adequate drainage to prevent the contact of water with burning metal that is not compatible for protecting exposures.

10.7.2.11 Evaluate the fire to determine whether the fire can burn itself out naturally to minimize hazards to personnel and losses to exposures.

10.7.2.12 Evaluate the control and shutdown of both domestic and fire protection water systems to prevent unintended contact of water with burning or molten combustible metal.

10.7.2.13 Use extinguishing agents that are compatible with the hazards present.

10.7.2.14 Use extinguishing agents for containment of small and incipient fires.

10.7.2.15 Use extreme caution with fires involving large quantities of product within structures.

10.7.2.16 Most fires involving combustible metals cannot be extinguished in a manner other than by providing an inert atmosphere of argon or helium — and nitrogen for alkali metals or iron — if the product is dry.

10.7.2.17 Most fires can be controlled by application of argon or helium — or nitrogen for alkali metals or iron — or by the development of an oxide crust.

10.7.2.18 The temperature of the metals involved in the fire can remain extremely high and the fire can flare up again if the product is disturbed prior to complete oxidation of the product or self-extinguishment.

10.7.2.19 Water in contact with molten combustible metals will result in violent steam explosions, and can cause hydrogen explosions and reactions.

10.7.2.20 Isolate the metal as much as possible; large fires might be impossible to extinguish.

10.7.2.21 The physical state of the product, such as chips, powder, fines, and dust, and the quantity of product involved in the fire, potentially involved in the fire, or both, are extremely important factors for emergency responders.

10.7.2.22 Fires involving large quantities of product within structures can result in rapid heat buildup and smoke generation beyond that normally encountered in fires involving ordinary combustibles.

10.7.2.23 Protection for covered liquid sulfur storage tanks, pits, and trenches shall be by one of the following means:

10.7.3 Firefighting Activities.

10.7.3.1 Trained employees shall be permitted to fight incipient-stage fires, provided the fire can be controlled with portable extinguishers or other dry extinguishing agent.

10.7.3.2 In case of fire in reactive metal chips, turnings, or powder compact, the pan or tray shall not be disturbed or moved, except by an individual knowledgeable in the fire aspects of combustible metals, until the fire has been extinguished and the material has cooled to ambient temperature.

10.7.3.3 Combustible-metal fires beyond the incipient stage shall be fought by professional firefighters, specially trained fire brigade personnel, or both.

10.7.3.4 Once the fire is extinguished and a crust is formed, the crust shall not be disturbed until the residue has cooled to room temperature.

10.7.3.5 Fire residues shall be protected to prevent adverse reactions and to prevent the formation of reactive or unstable compounds.

10.7.3.6 Burning combustible metals will burn through material used in the construction of most firefighter protective clothing. Some features (e.g., heavy quilted linings, aluminized outer shells) can reduce this risk. The self-contained breathing apparatus (SCBA) facepiece eye protection worn by firefighters adequately protects against the effects of a lithium fire, with the exception of the intense light given off by burning lithium. (See NFPA 1500.)

10.7.3.7 Specific testing indicates that white-light levels emitted from burning lithium exceed recommended levels, and extended lithium fire experience has shown that this intense light can cause serious damage to unprotected eyes. A clip-on adapter over an SCBA facepiece with a shaded glass lens equivalent to a No. 6 welding lens has been used successfully to reduce such hazards. A darker lens tends to obstruct the firefighter's view to an unacceptable degree.

10.7.3.8 Fire residues shall be disposed of in accordance with federal, state, and local regulations.

10.7.3.9 When drums or tote bins of burning materials can be moved safely, they shall be moved away from processing equipment and out of buildings as rapidly as possible.

10.7.4 Alkali Metals Firefighting Procedures.

10.7.4.1 While an alkali-metal fire is being fought, every effort shall be made to avoid splattering the burning alkali metals.

10.7.4.2 Once the fire is extinguished and a crust is formed, the crust shall not be disturbed until the residues have cooled to room temperature.

10.7.5 Firefighting Organization.

10.7.5.1 Only trained personnel shall be permitted to engage in fire control activity.

10.7.5.2 Personnel other than trained personnel shall be evacuated from the area.

10.7.5.3 Training shall emphasize the different types of fires anticipated and the appropriate agents and techniques to be used.

10.7.5.4 Firefighting personnel shall be given training in the extinguishment of test fires set in a safe location away from manufacturing buildings.

10.7.5.5 Training shall include all possible contingencies.

10.7.5.6 If professional or volunteer firefighters are admitted onto the property in the event of a fire emergency, their activity shall be directed by a unified incident command that includes knowledgeable plant personnel.

10.7.5.7 The following information on the safe handling of combustible metal fires shall be provided for emergency preparedness planning:

10.7.5.8 Water, when applied to most burning combustible metals, results in an increase in burning intensity and possible explosion.

10.7.5.9 Water applied to alkali metals not involved in the fire will result in hazardous decomposition, ignition, or explosion.

10.7.5.10 Application of carbon dioxide on combustible-metal fire adds to the intensity of the burning. Most combustible metals ignite and burn in 100 percent carbon dioxide atmospheres.

10.7.5.11 Dry chemical extinguishers react with alkali metals and intensify the fire.

10.7.5.12 Dry chemical extinguishers utilized on non-alkali metal fires are ineffective in controlling the metal fire but might be effective where ignitable (flammable or combustible) liquids are used and the metal is not yet involved in the fire.

10.7.5.13 Halogenated extinguishing agents used on alkali metals can result in an explosion.

10.7.5.14 Halogenated extinguishing agents will have a detrimental effect on other combustible metal fires, with the decomposition producing hazardous by-products.

10.7.5.15 A primary metal fire displays intense orange-to-white flame and can be associated with a heavy or large production of white or gray smoke.

10.7.5.16 When water is applied to non-alkali combustible metal, it can disassociate to the basic compounds, oxygen and hydrogen. Similar results occur with carbon dioxide.

10.7.5.17 When water is applied to alkali metals, hydroxides and hydrogen are generated immediately.

10.7.5.18 Fires involving combustible metals that contain moisture exhibit more intense burning characteristics than dry product.

10.7.5.19 Extreme heat can be produced. For example, burning titanium and zirconium have the potential to produce temperatures in excess of 7000°F (3857°C) and 8500°F (4690°C), respectively.

10.7.5.20 Dusts, fines, and powders of combustible metals present an explosion hazard, especially in confined spaces.

10.7.5.21 Dusts, fines, and powders of titanium and zirconium present extreme hazards; zirconium powders have ignition temperatures as low as 68°F (20°C). Static electric charges can ignite some dusts and powders of titanium and zirconium.

10.7.5.22 Zirconium and titanium powder can exhibit pyrophoric characteristics.

10.7.5.23 Turnings and chips of combustible metals can ignite and burn with intensity, especially if coated with a petroleum-based oil, with some spontaneous combustion having been observed.

10.7.5.24 With the exception of alkali metals, the larger the product, the smaller the likelihood of ignition. Bars, ingots, heavy castings, and thick plates and sheets are virtually impossible to ignite and, in most cases, self-extinguish when the heat source is removed.

10.7.5.25 The sponge product of most combustible metals burns at a slower rate but still produces tremendous heat.

10.7.5.26 Burning combustible metals can extract moisture from concrete and similar products that can intensify burning and cause spalling and explosion of the products and spewing of chunks of concrete.

10.7.5.27 Burning metal destroys asphalt and extracts moisture from rock which may explode spewing rock fragments.

10.7.5.28 Most fires involving non-alkali combustible metals usually cannot be extinguished, and unless they are placed in an inert atmosphere of argon or helium, they can only be controlled.

10.7.5.29 Fires involving large quantities of metals shall be allowed to cool for at least 24 hours prior to being disturbed to prevent re-ignition.

10.7.5.30 Fires will oxidize most metals and provide a protective covering limiting open burning.

10.7.5.31 Alkali metal fires can be extinguished with the suitable extinguishing agents correctly applied.

10.7.5.32 Combustible metal fines and powders that are stored and contain moisture can produce hydrogen gas.

10.7.5.33 Combustible metal fines and dusts that are reduced (not oxidized) and that come into contact with other metal oxides can result in thermite reactions.

10.7.5.34 Prior to the arrival of alkali metals on site, the local fire department shall be notified of the presence of water-reactive materials on site and shall be notified of the hazards of using water on alkali-metal fires.

10.8 Sulfur

10.8.1 Protection for covered liquid sulfur storage tanks, pits, and trenches shall be by one of the following means:

10.8.1.1 Inert gas system in accordance with NFPA 69, Standard on Explosion Prevention Systems.

10.8.1.2 Steam extinguishing system capable of delivering a minimum of 2.5 lb./min (1.13 kg/min) of steam per 100 ft³ (2.83 m³) of volume

10.8.1.3 Rapid sealing of the enclosure to exclude air

10.8.2 Snuffing Steam and Sealing Steam Precautions.

10.8.3 The vent systems on enclosed sulfur tanks and sulfur pits shall be designed to allow the required snuffing steam rate or sealing steam rate to vent without overpressuring the enclosure.

10.8.3.1 The vent systems shall also be designed for proper operation during normal operation.

10.8.4 Water Extinguishing Precautions.

10.8.4.1 Liquid sulfur stored in open containers shall be permitted to be extinguished with a fine water spray.

10.8.4.2 Use of high-pressure hose streams shall be avoided.

10.8.4.3 The quantity of water used shall be kept to a minimum.

10.8.5 Dry Chemical Extinguishers.

10.8.5.1 Where sulfur is being heated by a combustible heat transfer fluid, dry chemical extinguishers complying with NFPA 17 shall be provided.

10.8.6 It shall be permitted to use straight stream nozzles or combination nozzles to reach fires in locations that are otherwise inaccessible.

10.9 Wood Processing and Woodworking Facilities

10.10 Combustible Dusts and Particulate Solids Not Otherwise Specified

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NFPA_660_Firefighting_Task_Group_01042024_-_revisions.docx	Word version of requirements and annex material	

Statement of Problem and Substantiation for Public Comment

A task group was formed by the correlating committee to combine existing firefighting and emergency planning guidance and requirements into a fundamentals chapter 10. This information is based upon that group's efforts.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 285-NFPA 660-2024 [New Section after A.9.9.6.6]	
Public Comment No. 302-NFPA 660-2024 [New Section after 10.1]	
Public Comment No. 309-NFPA 660-2024 [New Section after 11.9.9.5]	
Public Comment No. 314-NFPA 660-2024 [New Section after 13.9.9.5.2.3]	
Public Comment No. 316-NFPA 660-2024 [New Section after 14.9.9.7.7]	
Public Comment No. 317-NFPA 660-2024 [New Section after 15.9.10.2]	
<u>Related Item</u>	
• Correlating Note/Task Group	

Submitter Information Verification

Submitter Full Name: Timothy Myers
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State:
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Submittal Date: Wed Jan 03 17:06:16 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but held
Resolution: Although the committee agrees that this material should be consolidated into Chapter 10, this is too substantial to change at the Second Draft stage and is being held for the next edition.

Chapter 10 Emergency Planning and Manual Firefighting

10.1 Emergency Planning & Response

- 10.2.1 A written emergency response plan shall be developed for preparing for and responding to work-related emergencies including, but not limited to, fires, flash fires, and explosions.
- 10.2.2 Emergency planning and response shall be in accordance with NFPA 600, *Standard on Facility Fire Brigades* (if applicable), and NFPA 1660, *Standard on Continuity, Emergency, and Crisis Management*.
- 10.2.3 The emergency response plan shall include, but not be limited to, the following:
 - 10.2.3.1 A means of notification for occupants in the event of fire and explosion
 - 10.2.3.2 A preplanned evacuation assembly area
 - 10.2.3.3 A person(s) designated to notify emergency responders, including the fire department
 - 10.2.3.4 A facility layout drawing(s) showing egress routes, hazardous chemical locations, and fire protection equipment
 - 10.2.3.5 Location of a safety data sheet(s) for hazardous chemicals
 - 10.2.3.6 Plant management emergency telephone number(s)
 - 10.2.3.7 Emergency response duties for occupants
 - 10.2.3.8 A person(s) designated to meet the offsite emergency responder(s) to coordinate the incident
 - 10.2.3.9 Interdepartmental and interplant cooperation
 - 10.2.3.10 Cooperation of outside agencies
 - 10.2.3.11 The release of accurate information to the public
- 10.2.4 The emergency response plan shall address locations for remote shutoff of supply systems when any of the following are present:
 - 10.2.4.1 Water (water from all types of sources)
 - 10.2.4.2 Electrical materials
 - 10.2.4.3 Flammable gases
 - 10.2.4.4 Ignitable (flammable or combustible) liquids
 - 10.2.4.5 Toxic materials
 - 10.2.4.6 Other hazardous materials

10.3 Emergency Response Plan and Training

- 10.3.1 Employee health and safety in operations shall depend on the recognition of actual or potential hazards, the control or elimination of those hazards, and the training of employees on safe working procedures.

- 10.3.2 The emergency response plan shall be available on-site or electronically.
- 10.3.3 Fires, when discovered, shall be reported promptly to facility management and emergency responders, including the fire department.
- 10.3.4 If a fire cannot be controlled promptly in its incipient stage, the endangered structure(s) shall be evacuated.
- 10.3.5 Emergency drills shall be performed annually by plant personnel and validated as required by process changes.
- 10.3.6 Plant personnel, including management, supervisors, and maintenance and operating personnel, shall be trained to participate in plans for controlling plant emergencies.
- 10.3.7 The emergency response plan shall be shared with relevant local community officials and emergency response agencies.
- 10.3.8 Malfunctions of the process shall be simulated and emergency actions undertaken as necessary.
- 10.3.9 Disaster drills that simulate a major catastrophic situation shall be undertaken periodically with the cooperation and participation of public fire, police, and other local community emergency units and nearby cooperating plants.
- 10.3.10 Specialized training for the public fire department(s) and industrial fire brigades shall be warranted when the facility-specific hazards dictate that the methods to control and extinguish a fire are outside of their normal arena of traditional firefighting.

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- 10.4.1 Those individuals responsible for manual fire suppression shall have a fire protection plan.
- 10.4.2 Proper protective clothing, respiratory protection, and adequate eye protection shall be used by all responding firefighting personnel assigned to a combustible metal fire equipped to the requirements of NFPA 600, *Standard on Facility Fire Brigades* (if applicable) or NFPA 1081, *Standard for Facility Fire Brigade Member Professional Qualifications*.
- 10.4.3 The evaluation of the risk to facility personnel and firefighters shall be made based on discussions with the responding fire department(s) and review of the DHA.
- 10.4.4 The potential effectiveness of manual firefighting shall be assessed by experienced firefighting personnel after reviewing the hazard assessment documentation developed in accordance with the DHA.
- 10.4.5 For materials that can be effectively extinguished with water, hose streams shall be used with great care to avoid creating dust clouds or causing structural damage to bins.
- 10.4.5.1 Straight stream nozzles shall not be used on fires in areas where dust clouds can be generated.

- 10.4.5.2 Fire responders shall be cautioned when using straight stream nozzles in the vicinity of combustible dust accumulations that dust clouds can be formed and can be ignited by any residual smoldering or fire.
- 10.4.5.3 Straight stream nozzles or combination nozzles shall be permitted to be used to reach fires in locations that are otherwise inaccessible with the nozzles specified in 11.8.10.3.5.
- 10.4.5.4 Fog nozzles or Portable spray hose nozzles that are listed or approved for use on Class C fires shall be provided in areas that contain dust, to limit the potential for generating unnecessary airborne dust during firefighting operations.
- 10.4.6 Where firefighting water or wet product can accumulate in the system, the vessel, pipe supports, and drains shall be designed to support the additional water weight in accordance with NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists and Particulate Solids*.

10.5 Firefighting Operations / Activities

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- 10.5.2 Clothing Fires.
 - 10.5.2.1 Emergency procedures for handling clothing fires shall be established as part of the plan.
 - 10.5.2.2 If deluge showers are installed, they shall be located away from dry metal powder-processing and metal powder-handling areas if water is not an effective extinguishing agent.
 - 10.5.2.3 The plan shall address locations for remote shutoff of supply systems when any of the following are present:
 - Water (water from all types of sources)
 - Electrical materials
 - Flammable gases
 - Ignitable (flammable or combustible) liquids
 - Toxic materials
 - Other hazardous materials
 - 10.5.2.4 In plant areas where water is excluded, fire blankets shall be distributed for extinguishing clothing fires.
 - 10.5.2.5 Elevator leg fires
 - 10.5.2.5.1 Burning material shall not be transferred into legs.
 - 10.5.2.6 Conveyor belt fires

10.5.2.7 Dryer fires

10.5.2.8 Concrete bin or silo and steel tank fires

10.5.2.9 Concrete Bin or Silo and Steel Tank Smolders

10.5.2.10 Fumigant or Chemical Fires

10.5.2.11 Water Gas Reaction

10.5.2.12 Bearing Fires

10.5.2.12.1 Bearing fires shall be extinguished with a gentle application of water fog onto the bearing for cooling.

10.5.2.12.2 If water is not available, other means of extinguishment shall be permitted to be used on the bearing fire, provided caution is taken to avoid the suspension of combustible dust.

10.5.2.12.3 If the bearing is located inside equipment, material flow shall be stopped, equipment shall be shut down, and extreme caution shall be used when equipment is opened.

10.6 Agricultural and Food Processing

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10.7.2 The following list of actions to be performed as well as information regarding the hazards of combustible metals shall be provided to emergency responders for the safe handling of combustible metal fires:

10.7.2.1 Perform a size-up, evaluation, and identification of metals involved in the fire.

10.7.2.2 Ensure control of utilities (e.g., water, gases, power, etc.) to affected areas.

10.7.2.3 Review safety data sheets (SDSs) for the involved products, and if available, contact those familiar with the product and hazards.

10.7.2.4 Evaluate whether the fire can be isolated safely and allowed to burn out.

10.7.2.5 Determine whether uninvolved product and exposures — other than alkali metals — can be protected by hose streams, after an adequate review has been completed to ensure any runoff from hose streams does not come into contact with burning or molten combustible metal.

10.7.2.6 Do not apply water to alkali metals in either a fire or non-fire situation.

10.7.2.7 Use an inert blanket, such as argon, helium, or nitrogen, if the fire is burning in a closed container, such as a dust collection system, to control the fire

where an adequate delivery system is available and personnel safety is considered.

- 10.7.2.8 Evaluate the potential for explosion.
- 10.7.2.9 Use extreme caution with fires involving combustible-metal powders, dusts, and fines because of the possibility of explosions, especially if the product becomes airborne and there is an available ignition source.
- 10.7.2.10 Evaluate whether there is adequate drainage to prevent the contact of water with burning metal that is not compatible for protecting exposures.
- 10.7.2.11 Evaluate the fire to determine whether the fire can burn itself out naturally to minimize hazards to personnel and losses to exposures.
- 10.7.2.12 Evaluate the control and shutdown of both domestic and fire protection water systems to prevent unintended contact of water with burning or molten combustible metal.
- 10.7.2.13 Use extinguishing agents that are compatible with the hazards present.
- 10.7.2.14 Use extinguishing agents for containment of small and incipient fires.
- 10.7.2.15 Use extreme caution with fires involving large quantities of product within structures.
- 10.7.2.16 Most fires involving combustible metals cannot be extinguished in a manner other than by providing an inert atmosphere of argon or helium — and nitrogen for alkali metals or iron — if the product is dry.
- 10.7.2.17 Most fires can be controlled by application of argon or helium — or nitrogen for alkali metals or iron— or by the development of an oxide crust.
- 10.7.2.18 The temperature of the metals involved in the fire can remain extremely high and the fire can flare up again if the product is disturbed prior to complete oxidation of the product or self-extinguishment.
- 10.7.2.19 Water in contact with molten combustible metals will result in violent steam explosions, and can cause hydrogen explosions and reactions.
- 10.7.2.20 Isolate the metal as much as possible; large fires might be impossible to extinguish.
- 10.7.2.21 The physical state of the product, such as chips, powder, fines, and dust, and the quantity of product involved in the fire, potentially involved in the fire, or both, are extremely important factors for emergency responders.
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- 10.7.2.23 Protection for covered liquid sulfur storage tanks, pits, and trenches shall be by one of the following means:
- 10.7.3 Firefighting Activities.

- 10.7.3.1 Trained employees shall be permitted to fight incipient-stage fires, provided the fire can be controlled with portable extinguishers or other dry extinguishing agent.
- 10.7.3.2 In case of fire in reactive metal chips, turnings, or powder compact, the pan or tray shall not be disturbed or moved, except by an individual knowledgeable in the fire aspects of combustible metals, until the fire has been extinguished and the material has cooled to ambient temperature.
- 10.7.3.3 Combustible-metal fires beyond the incipient stage shall be fought by professional firefighters, specially trained fire brigade personnel, or both.
- 10.7.3.4 Once the fire is extinguished and a crust is formed, the crust shall not be disturbed until the residue has cooled to room temperature.
- 10.7.3.5 Fire residues shall be protected to prevent adverse reactions and to prevent the formation of reactive or unstable compounds.
- 10.7.3.6 Burning combustible metals will burn through material used in the construction of most firefighter protective clothing. Some features (e.g., heavy quilted linings, aluminized outer shells) can reduce this risk. The self-contained breathing apparatus (SCBA) facepiece eye protection worn by firefighters adequately protects against the effects of a lithium fire, with the exception of the intense light given off by burning lithium. (*See NFPA 1500.*)
- 10.7.3.7 Specific testing indicates that white-light levels emitted from burning lithium exceed recommended levels, and extended lithium fire experience has shown that this intense light can cause serious damage to unprotected eyes. A clip-on adapter over an SCBA facepiece with a shaded glass lens equivalent to a No. 6 welding lens has been used successfully to reduce such hazards. A darker lens tends to obstruct the firefighter's view to an unacceptable degree.
- 10.7.3.8 Fire residues shall be disposed of in accordance with federal, state, and local regulations.
- 10.7.3.9 When drums or tote bins of burning materials can be moved safely, they shall be moved away from processing equipment and out of buildings as rapidly as possible.
- 10.7.4 Alkali Metals Firefighting Procedures.
 - 10.7.4.1 While an alkali-metal fire is being fought, every effort shall be made to avoid splattering the burning alkali metals.
 - 10.7.4.2 Once the fire is extinguished and a crust is formed, the crust shall not be disturbed until the residues have cooled to room temperature.
- 10.7.5 Firefighting Organization.
 - 10.7.5.1 Only trained personnel shall be permitted to engage in fire control activity.
 - 10.7.5.2 Personnel other than trained personnel shall be evacuated from the area.
 - 10.7.5.3 Training shall emphasize the different types of fires anticipated and the appropriate agents and techniques to be used.

- 10.7.5.4 Firefighting personnel shall be given training in the extinguishment of test fires set in a safe location away from manufacturing buildings.
- 10.7.5.5 Training shall include all possible contingencies.
- 10.7.5.6 If professional or volunteer firefighters are admitted onto the property in the event of a fire emergency, their activity shall be directed by a unified incident command that includes knowledgeable plant personnel.
- 10.7.5.7 The following information on the safe handling of combustible metal fires shall be provided for emergency preparedness planning:
- 10.7.5.8 Water, when applied to most burning combustible metals, results in an increase in burning intensity and possible explosion.
- 10.7.5.9 Water applied to alkali metals not involved in the fire will result in hazardous decomposition, ignition, or explosion.
- 10.7.5.10 Application of carbon dioxide on combustible-metal fire adds to the intensity of the burning. Most combustible metals ignite and burn in 100 percent carbon dioxide atmospheres.
- 10.7.5.11 Dry chemical extinguishers react with alkali metals and intensify the fire.
- 10.7.5.12 Dry chemical extinguishers utilized on non-alkali metal fires are ineffective in controlling the metal fire but might be effective where ignitable (flammable or combustible) liquids are used and the metal is not yet involved in the fire.
- 10.7.5.13 Halogenated extinguishing agents used on alkali metals can result in an explosion.
- 10.7.5.14 Halogenated extinguishing agents will have a detrimental effect on other combustible metal fires, with the decomposition producing hazardous by-products.
- 10.7.5.15 A primary metal fire displays intense orange-to-white flame and can be associated with a heavy or large production of white or gray smoke.
- 10.7.5.16 When water is applied to non-alkali combustible metal, it can disassociate to the basic compounds, oxygen and hydrogen. Similar results occur with carbon dioxide.
- 10.7.5.17 When water is applied to alkali metals, hydroxides and hydrogen are generated immediately.
- 10.7.5.18 Fires involving combustible metals that contain moisture exhibit more intense burning characteristics than dry product.
- 10.7.5.19 Extreme heat can be produced. For example, burning titanium and zirconium have the potential to produce temperatures in excess of 7000°F (3857°C) and 8500°F (4690°C), respectively.
- 10.7.5.20  Dusts, fines, and powders of combustible metals present an explosion hazard, especially in confined spaces.

- 10.7.5.21 Dusts, fines, and powders of titanium and zirconium present extreme hazards; zirconium powders have ignition temperatures as low as 68°F (20°C). Static electric charges can ignite some dusts and powders of titanium and zirconium.
- 10.7.5.22 Zirconium and titanium powder can exhibit pyrophoric characteristics.
- 10.7.5.23 Turnings and chips of combustible metals can ignite and burn with intensity, especially if coated with a petroleum-based oil, with some spontaneous combustion having been observed.
- 10.7.5.24 With the exception of alkali metals, the larger the product, the smaller the likelihood of ignition. Bars, ingots, heavy castings, and thick plates and sheets are virtually impossible to ignite and, in most cases, self-extinguish when the heat source is removed.
- 10.7.5.25 The sponge product of most combustible metals burns at a slower rate but still produces tremendous heat.
- 10.7.5.26 Burning combustible metals can extract moisture from concrete and similar products that can intensify burning and cause spalling and explosion of the products and spewing of chunks of concrete.
- 10.7.5.27 Burning metal destroys asphalt and extracts moisture from rock which may explode spewing rock fragments.
- 10.7.5.28 Most fires involving non-alkali combustible metals usually cannot be extinguished, and unless they are placed in an inert atmosphere of argon or helium, they can only be controlled.
- 10.7.5.29 Fires involving large quantities of metals shall be allowed to cool for at least 24 hours prior to being disturbed to prevent re-ignition.
- 10.7.5.30 Fires will oxidize most metals and provide a protective covering limiting open burning.
- 10.7.5.31 Alkali metal fires can be extinguished with the suitable extinguishing agents correctly applied.
- 10.7.5.32 Combustible metal fines and powders that are stored and contain moisture can produce hydrogen gas.
- 10.7.5.33 Combustible metal fines and dusts that are reduced (not oxidized) and that come into contact with other metal oxides can result in thermite reactions.
- 10.7.5.34 Prior to the arrival of alkali metals on site, the local fire department shall be notified of the presence of water-reactive materials on site and shall be notified of the hazards of using water on alkali-metal fires.

10.8 Sulfur

- 10.8.1 Protection for covered liquid sulfur storage tanks, pits, and trenches shall be by one of the following means:

10.8.1.1 Inert gas system in accordance with NFPA 69, *Standard on Explosion Prevention Systems*.

10.8.1.2 Steam extinguishing system capable of delivering a minimum of 2.5 lb./min (1.13 kg/min) of steam per 100 ft³ (2.83 m³) of volume

10.8.1.3 Rapid sealing of the enclosure to exclude air

10.8.2 Snuffing Steam and Sealing Steam Precautions.

10.8.3 The vent systems on enclosed sulfur tanks and sulfur pits shall be designed to allow the required snuffing steam rate or sealing steam rate to vent without overpressuring the enclosure.

10.8.3.1 The vent systems shall also be designed for proper operation during normal operation.

10.8.4 Water Extinguishing Precautions.

10.8.4.1 Liquid sulfur stored in open containers shall be permitted to be extinguished with a fine water spray.

10.8.4.2 Use of high-pressure hose streams shall be avoided.

10.8.4.3 The quantity of water used shall be kept to a minimum.

10.8.5 Dry Chemical Extinguishers.

10.8.5.1 Where sulfur is being heated by a combustible heat transfer fluid, dry chemical extinguishers complying with NFPA 17 shall be provided.

10.8.6 It shall be permitted to use straight stream nozzles or combination nozzles to reach fires in locations that are otherwise inaccessible.

10.9 Wood Processing and Woodworking Facilities

10.10 Combustible Dusts and Particulate Solids Not Otherwise Specified

Annex:

A.10.2.1

All plant personnel, including management, supervisors, and maintenance and operating personnel, should be trained to participate in plans for controlling plant emergencies.

The emergency plan should contain the following elements:

1. A signal or alarm system
2. Identification of means of egress
3. Minimization of effects on operating personnel and the community
4. Minimization of property and equipment losses
5. Interdepartmental and interplant cooperation
6. Cooperation of outside agencies

7. The release of accurate information to the public

Emergency drills should be performed annually by plant personnel. Malfunctions of the process should be simulated and emergency actions undertaken. Disaster drills that simulate a major catastrophic situation should be undertaken periodically with the cooperation and participation of public fire, police, and other local community emergency units and nearby cooperating plants. Specialized training for the public fire department(s) and industrial fire brigades can be warranted due to facility-specific hazards where the methods to control and extinguish a fire can be outside of their normal arena of traditional firefighting. (*See OSHA's publication, Firefighting Precautions at Facilities with Combustible Dust, for additional information.*)

A.10.3.10 *See OSHA's publication, Firefighting Precautions at Facilities with Combustible Dust, for additional information.*

A.10.4.1 This plan should meet the recommendations contained in the *National Grain and Feed Association Research Report, Emergency Preplanning and Fire Fighting Manual - A Guide for Grain Elevator Operators and Fire Department Officials* or other industry or commodity specific guide.

A.10.4.2.1

Burning combustible metals will burn through material used in the construction of most firefighter protective clothing. Some features (e.g., heavy quilted linings, aluminized outer shells) can reduce this risk. The self-contained breathing apparatus (SCBA) facepiece eye protection worn by firefighters adequately protects against the effects of a lithium fire, with the exception of the intense light given off by burning lithium. (*See NFPA 1500.*)

Specific testing indicates that white-light levels emitted from burning lithium exceed recommended levels, and extended lithium fire experience has shown that this intense light can cause serious damage to unprotected eyes. A clip-on adapter over an SCBA facepiece with a shaded glass lens equivalent to a No. 6 welding lens has been used successfully to reduce such hazards. A darker lens tends to obstruct the firefighter's view to an unacceptable degree.

A.10.4.3 Manual firefighting could pose an unacceptable risk to facility personnel and emergency responders.

A.10.4.5.4 A nozzle listed or approved for use on Class C fires produces a fog discharge pattern that is less likely than a straight stream nozzle to suspend combustible dust, which could otherwise produce a dust flash fire or explosion potential.

A.10.5.2.4 *Elevator Leg Fires.* Material flow into a leg should be stopped and the leg should be shut down. Leg fires should be extinguished by water fog or gentle application of water. Fires

should be located by feeling the leg casing for heat or observing discoloration of metal. If the location is unknown, water should be applied first in the boot section, then in the bin-pulley access door, and last in the head section.

A.10.5.2.5 Conveyor Belt Fires. The conveyor belt should be shutdown (halted). Conveyor belt fires should be extinguished by application of water. Material flow to the conveyor belt should be stopped. If necessary, the belt should be cut to isolate the fire.

A.10.5.2.6 Dryer Fires. Dryer fires should be extinguished by removing burning material from the dryer or gentle application of water. Fuel to burners, fans, and material flow into the dryer and from the facility should be stopped. If necessary, emergency dump should be used to remove material from the dryer.

A.10.5.2.7 Concrete Bin or Silo and Steel Tank Fires. Concrete bin or silo fires should be extinguished by wetting the top surface of the material with gentle application of water at a low flow rate directly to the burning materials, and then removal of burning material from the bin or silo directly to the outside. Fire should be located by thermometer probes, thermographic photography, or feeling heat on bin or silo surfaces. Openings to the bin or silo should be sealed to limit oxygen entry. Material flow to and from the bin or silo should be stopped. Firefighting operations should be done from outside the bin or silo. Fires should be isolated by selective unloading of material onto the ground.

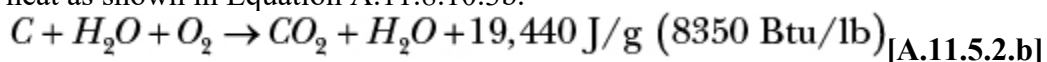
A.10.5.2.8 Concrete Bin or Silo and Steel Tank Smolders. A deep-seated smolder in a bin, tank, or silo should not be extinguished with water. The addition of water can generate CO that would build up in the bin and potentially explode [see list item (7)]. A better approach is to inject inert gas (such as carbon dioxide or nitrogen) to displace the oxygen and smother the smolder.

A.10.5.2.9 Fumigant or Chemical Fires. Fires involving fumigants containing phosphine should be extinguished by inert material or nonaqueous agent used for Class B fires. Water should not be used for phosphine fires to avoid exothermic reaction and development of explosive gases.

A.10.5.2.10 Water Gas Reaction. Application of small amounts of water on glowing grain in a partially confined space, such as a grain silo, and in the presence of air can generate a water gas reaction. The glowing grain must be at a temperature of at least 1290°F to 1470°F (700°C to 800°C), and initial water contact might not cool the mass of glowing grain below 1110°F (600°C). The partial oxidation reduction between carbon and water forms carbon monoxide and hydrogen as shown in Equation A.11.5.2.10.



In the presence of oxygen (air), the carbon monoxide and hydrogen burn, immediately releasing heat as shown in Equation A.11.8.10.3b.



In a partially confined space, the combustion energy will rapidly pressurize the space beyond what the silo walls or tops can withstand, causing destruction of the silo.

A.10.7 The objectives in fighting combustible metal fires are isolation and containment, rather than extinguishment. Water and other liquids have proved ineffective in extinguishing combustible metal fires. Streams of water intensify most combustible metal fires by feeding it oxygen. There is also the possibility of causing a steam or hydrogen explosion, particularly if large amounts of combustible metal are involved. The great affinity of high-temperature combustible metal for oxygen frees a considerable amount of hydrogen, which can reach explosive concentrations in confined spaces. Entrapment of water under any burning or hot combustible metal can result in a steam explosion.

Because of their unique nature, combustible metal fires demand a comprehensive fire protection plan wherever combustible metal is processed, handled, used, or stored. This plan should include specific actions in the event of a combustible metal fire and should be coordinated with the local facility management, responding firefighters, and medical personnel.

The plan should recognize the extreme hazards associated with combustible metal–water reactions that might occur with sprinkler water. Specific attention should be given to an evacuation plan for personnel in the event of any release of water.

Properly trained personnel who work with combustible metal know its hazards. Such personnel are best equipped to extinguish a combustible metal fire in its incipient stage. Training should include sufficient information to determine whether extinguishment can be accomplished safely and effectively.

A.10.7.3.1 One of the greatest dangers to firefighters is the splattering effect of burning alkali metals. Molten alkali metal is very fluid and easily spread; therefore, extreme care needs to be taken when applying firefighting agent. The force used to deliver agent from an extinguisher can cause the molten alkali to splash to adjacent areas. Therefore, the delivery technique is very important. If direct agent application becomes hazardous, indirect application techniques should be used. Deflecting agent off another object or directing the agent stream above the hazard and letting the agent fall by gravity can be effective.

A.10.7.3.2 Forming a crust over burning alkali metals reduces the available oxygen and eliminates exothermic reactions. Extinguishing agent should first be applied to the white-hot burning areas, then evenly applied to the mass, controlling the flow to form an oxygen-depleting crust. Since alkali metal tends to flow easily through any weak spots, agents should be applied evenly to construct a continuous crust. If the alkali metal surfaces, additional agent should be applied to strengthen the crust.

Actual crust formation is created by the ability of some powdered agents to absorb heat from the alkali metals. In the case of copper powder, an alkali metal–copper alloy is formed as heat is absorbed from an alkali metal. Once the crust is formed, the temperature of the alkali metal decreases and exothermic reactions are reduced. Extreme care should be taken to ensure that the crust is not disturbed or broken until the temperature of the alkali metal is decreased to the point where resolidification occurs (or in the case of NaK, until the mass is at or near room temperature).

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A.10.7.4.6 It is recommended that a practice fire drill be conducted once each year to familiarize local fire department personnel with the proper methods of fighting Class D fires. Professional or volunteer firefighters from outside the plant cannot be expected to be trained for the specific fire and life hazards associated with metal powder and fires. In the interest of their own safety, they should be directed by the plant's safety officer or firefighting officer.

**Public Comment No. 68-NFPA 660-2023 [Chapter 10]****Chapter 10** Reserved

10.1

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._92.pdf	NFPA 660 CC Note No. 92	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 92 appeared in the First Draft Report in NFPA 660.

A task group will be formed to review requirements for firefighting and compile them into a new Chapter 10.

Related Item

- CC Note 92

Submitter Information Verification**Submitter Full Name:****Organization:** Notes**Street Address:****City:****State:****Zip:****Submittal Date:** Tue Dec 19 11:01:29 EST 2023**Committee:** CMD-FUN**Committee Statement****Committee** Rejected but held**Action:****Resolution:** Although the committee agrees that this material should be consolidated into Chapter 10, this is too substantial to change at the Second Draft stage and is being held for the next edition.



Correlating Committee Note No. 92-NFPA 660-2023 [Chapter 10]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Wed Aug 16 16:27:59 EDT 2023

Committee Statement

Committee Statement: A task group will be formed to review requirements for firefighting and compile them into a new Chapter 10.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok

**Public Comment No. 302-NFPA 660-2024 [New Section after 10.1]**

Change the number of chapters 11-15 to 20-25 and add reserved chapters 11-19 to allow for maintaining consistency in chapter and subchapter numbers.

Statement of Problem and Substantiation for Public Comment

There is inconsistency in the numbering of fundamental chapters and commodity and industry specific subchapters. In most cases, sub chapters X.1 to X.9 in commodity or industry specific standards correspond to the fundamental chapters 1-9 making it easier for the user to compare requirements between the fundamentals and commodity or industry specific sub chapters. However, some commodity or industry specific chapters have subchapters beyond X.9 (Metals 12.10 – 12.19, Sulfur 13.10-13.11, Wood 14.10-14.12). This causes confusion and inconsistency if a user tries to compare X.11 and higher subchapters with chapters 11 and higher which are not fundamental. This will also add confusion and require renumbering with introduction of a new Chapter 10 on firefighting. Additionally, large fundamental chapters may be subdivided over time. Adding a gap of reserved chapter numbers between the fundamentals and commodity and industry specific standards will allow for more consistent numbering structure and ease of comparison between fundamentals and commodity and industry specific chapters between revision cycles.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 225-NFPA 660-2024 [Chapter 10]	
Public Comment No. 312-NFPA 660-2024 [New Section after 12.10.1.2.2]	
Public Comment No. 314-NFPA 660-2024 [New Section after 13.9.9.5.2.3]	
Public Comment No. 317-NFPA 660-2024 [New Section after 15.9.10.2]	

Related Item

- Correlating note/task group to add Chapter 10

Submitter Information Verification

Submitter Full Name: Timothy Myers
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City:
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Submittal Date: Thu Jan 04 16:17:18 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The CMD-FUN committee does not have the ability to change the other committees' chapter numbers, but recommends that the Correlating Committee does not make this change. A number of "Reserved" chapters could raise concerns from the users that a large amount of new, substantive requirements are coming.



Public Comment No. 107-NFPA 660-2023 [Section No. A.1.3]

A.1.3

The following is a suggested procedure for determining the requirements for a piece of equipment, building, or facility following the flow chart in Figure 1.3.1:

- (1) Refer to the core chapters (Chapters 4 through 9) for requirements that apply to all of the industries or commodities covered by NFPA 660 [unless otherwise addressed in the specific chapter as noted in (2)]. This will include the following:
 - (a) Determining the combustibility hazards by following Chapter 5
 - (b) Performing a dust hazards analysis in accordance with Chapter 7
 - (c) Using the methods in Chapter 6 or Chapter 9 to manage the hazards
 - (d) Creating and implementing a hazard management plan in accordance with Chapter 8
- (2) Refer to the applicable industry- or commodity-specific chapter of the standard (Chapters 11 through 14) for additional requirements, prohibitions, or allowances specific to that industry or commodity. The scope of each chapter is located in __.1.1. The standard has been arranged so that requirements under a certain heading can be compared to requirements under that same heading in the industry- or commodity-specific chapters.
- (3) Where a conflict exists between the core chapters and the industry- or commodity-specific chapters, refer to the conflicts section (Section 1.6) to resolve.

Some industry- or commodity-specific topics are not addressed in the core chapters (Chapters 4 through 9). These are located in __.10 and beyond. Examples are thermal oil heating systems covered in Section 14.10 and handling of liquid sulfur covered in Sections 13.10 and 13.11.

Table A.1.3 guides the user to the appropriate sections of the standard for specific requirements.

For example, requirements for air-material separators (AMS) are located in 9.4.4, where Chapter 9 is the core chapter addressing hazard management, and also the __.9.4.4 subsection of the applicable industry- or commodity-specific chapter.

To determine the requirements for an AMS in an agricultural dust facility, the user first refers to 9.4.4, AMS, to determine the fundamental requirements and then refers to Chapter 11, Agricultural and Food Processing, 11.9.4.4 to review any additional requirements, prohibitions, or allowances specific to agricultural dusts. For AMS locations, the user would check 9.4.4.6, AMS Locations, for fundamentals and 11.9.4.4.6 for specifics.

Similarly, if evaluating pneumatic conveying systems for metal dust, the user first refers to 9.4.3, Pneumatic Conveying, Dust Collection, and Centralized Vacuum Cleaning Systems, and 9.4.3.2, Specific Requirements for Pneumatic Conveying Systems, for fundamental requirements. Then, the user refers to Chapter 12, Combustible Metals, and refers to 12.9.4.3 and 12.9.4.3.2 to review any additional requirements, prohibitions, or allowances specific to metal dusts.

Table A.1.3 Organization of Core Chapters and Industry- or Commodity-Specific Chapters

<u>Core/Fundamental Chapters</u>	<u>Subject/Title</u>	<u>Industry- or Commodity-Specific Chapters</u>
Chapter 1	Administration	___.1
1.1	Scope	___.1.1
1.2	Purpose	___.1.2
1.3	Application	___.1.3
1.4	Retroactivity	___.1.4
1.5	Equivalency	___.1.5
1.6	Conflicts	___.1.6
1.7	Units and Formulas	___.1.7
Chapter 4	General Requirements	___.4
4.1	General	___.4.1
4.2	Objectives	___.4.2
4.2.1	Life Safety	___.4.2.1
4.2.2	Mission Continuity	___.4.2.2
4.2.3	Mitigation of Fire Spread, Explosions, or Releases of Hazardous Materials	___.4.2.3
4.2.4	Compliance Options	___.4.2.4
	Structural Integrity	___.4.2.5
Chapter 5	Hazard Identification	___.5
5.1	Responsibility	___.5.1
5.2	Screening for Combustibility or Explosibility	___.5.2
5.3	Self-Heating and Reactivity Hazards	___.5.3
5.4	Combustibility and Explosibility Tests	___.5.4
5.4.1	Determination of Combustibility (Fire Hazard Potential)	___.5.4.1

<u>Core/Fundamental Chapters</u>	<u>Subject/Title</u>	<u>Industry- or Commodity-Specific Chapters</u>
5.4.2	Determination of Flash Fire Potential	__5.4.2
5.4.3	Determination of Explosibility	__5.4.3
5.4.4	Quantification of Combustibility and Explosibility Characteristics	__5.4.4
5.5	Sampling	__5.5
5.5.1	Sampling Plan	__5.5.1
5.5.2	Mixtures	__5.5.2
5.5.3	Representative Samples	__5.5.3
5.5.4	Sample Collection	__5.5.4
	Organometallic materials	__5.6
Chapter 6	Performance-Based Design Option	__6
6.1	General Requirements	__6.1
6.1.1	Retained Prescriptive Requirements	__6.1.1
6.1.2		__6.1.2
6.1.3	Approved Qualifications	__6.1.3
6.1.4	Document Requirements	__6.1.4
6.1.5	Re-evaluation	__6.1.5
6.1.6	Sources of Data	__6.1.6
6.1.7	Maintenance of the Design Features	__6.1.7
	Independent Review	__6.1.8
6.2	Risk Component and Acceptability	__6.2
6.3	Performance Criteria	__6.3
6.3.1	Life Safety	__6.3.1
6.3.2	Structural Integrity	__6.3.2
6.3.3	Mission Continuity	__6.3.3
6.3.4	Mitigation of Spread of Fires, Flash Fires, and Explosions	__6.3.4
6.3.5	Effects of Explosions	__6.3.5
	Effects of Deflagrations	__6.3.6
	Prevention of Ignition	__6.3.7
6.4	Design Scenarios	__6.4
6.4.1	Fire Scenarios	__6.4.1
6.4.2	Flash Fire and Explosion Scenarios	__6.4.2
6.5	Evaluation of Proposed Design	__6.5
	Safety Factors	__6.6
Chapter 7	Dust Hazards Analysis (DHA)	__7
7.1	General Requirements	__7.1
7.1.1	Retroactivity	__7.1.1
7.2	Criteria	__7.2
7.2.1	Overview	__7.2.1
7.2.2	Qualifications	__7.2.2
7.2.3	Documentation	__7.2.3
7.3	Methodology	__7.3
7.3.1	General	__7.3.1
7.3.2	Material Evaluation	__7.3.2
7.3.3	Process Systems	__7.3.3
7.3.4	Building or Building Compartments	__7.3.4
	Layer Depth Criterion Method	__7.3.5
	Mass Method A	__7.3.6
	Mass Method B	__7.3.7
	Risk Assessment Method	__7.3.8
	Molten metal hazards analysis criteria	__7.4

<u>Core/Fundamental Chapters</u>	<u>Subject/Title</u>	<u>Industry- or Commodity-Specific Chapters</u>
	Molten metal hazards analysis Methodology	__7.5
	Risk Evaluation	__7.6
	Dust Explosion and Flash Fire Hazard Areas	__7.7
Chapter 8	Management Systems	__8
8.1	Retroactivity	__8.1
8.2	General	__8.2
8.3	Operating Procedures and Practices	__8.3
8.4	Housekeeping	__8.4
8.4.1	General	__8.4.1
8.4.2	Methodology	__8.4.2
8.4.2.1	Procedure	__8.4.2.1
8.4.2.2	Vacuum Cleaning Method	__8.4.2.2
8.4.2.3	Sweeping, Shoveling, Scoop, and Brush Cleaning Method	__8.4.2.3
8.4.2.4	Water Washdown Cleaning Method	__8.4.2.4
8.4.2.5	Water Foam Washdown Systems. (Reserved)	__8.4.2.5
8.4.2.6	Compressed Air Blowdown Method	__8.4.2.6
8.4.2.7	Steam Blow Down Method. (Reserved)	__8.4.2.7
8.4.3	Training	__8.4.3
8.4.4	Equipment. (Reserved)	__8.4.4
8.4.5	Vacuum Trucks	__8.4.5
8.4.6	Frequency and Goal	__8.4.6
8.4.7	Auditing and Documentation	__8.4.7
8.5	Hot Work	__8.5
8.5.6	Use of Portable Equipment	__8.5.6
8.5.7	Propellant-Actuated Devices and Explosive-Actuated Devices	__8.5.7
8.6	Personal Protective Equipment	__8.6
8.6.1	PPE Applicability	__8.6.1
8.6.2	Workplace Hazard Assessment	__8.6.2
8.6.3	Limitations of PPE Application. (Flame-Resistant Garments)	__8.6.3
8.6.4	Limitations of PPE to Combustible Dust Flash Fires. (Reserved)	__8.6.4
8.6.5	Face, Hands, and Footwear Protection. (Reserved)	__8.6.5
	Primary PPE for molten metals	__8.6.6
	Primary PPE for dust flash fires	__8.6.7
	Secondary PPE for General Work Areas Near or Containing Combustible Metals	__8.6.8
8.7	Inspection, Testing, and Maintenance	__8.7
	General Requirements	__8.7.1
	Specific Equipment Maintenance	__8.7.2
	Impairments of Fire Protection and Explosion Prevention Systems	__8.7.3
8.8	Training and Hazard Awareness	__8.8
8.9	Contractors	__8.9
8.9.3	Contractor Training	__8.9.3
8.10	Emergency Planning and Response	__8.10
8.11	Incident Investigation	__8.11
8.12	Management of Change	__8.12
8.13	Pre-Startup Safety Review	__8.13
8.114	Documentation Retention	__8.14
8.15	Management Systems Review	__8.15
8.16	Employee Participation	__8.16
	Warning Signs	__8.17

<u>Core/Fundamental Chapters</u>	<u>Subject/Title</u>	<u>Industry- or Commodity-Specific Chapters</u>
	Misc Storage in Grain-Handling Facilities	__8.18
Chapter 9	Hazard Management: Mitigation and Prevention	__9
9.1	Inherently Safer Designs	__9.1
9.2	Risk Assessment	__9.2
9.3	Building Design	__9.3
9.3.1	Construction	__9.3.1
9.3.2	Building or Building Compartment Protection	__9.3.2
9.3.3	Life Safety	__9.3.3
9.3.4	Construction Features to Limit Accumulation	__9.3.4
9.3.5	Separation of Hazard Areas from Other Hazard Areas and from Other Occupancies	__9.3.5
9.3.5.1	General	__9.3.5.1
9.3.5.2	Use of Segregation	__9.3.5.2
9.3.5.3	Use of Separation	__9.3.5.3
9.3.5.4	Use of Detachment	__9.3.5.4
9.4	Equipment Design	__9.4
9.4.1	General	__9.4.1
9.4.2	Design for Dust Containment	__9.4.2
9.4.3	Pneumatic Conveying, Dust Collection, and Centralized Vacuum Cleaning Systems	__9.4.3
9.4.3.1	General Requirements	__9.4.3.1
9.4.3.1.4	Systems That Convey Hybrid Mixtures	__9.4.3.1.4
9.4.3.1.5	Operations	__9.4.3.1.5
9.4.3.1.6	Airflow Control Valves	__9.4.3.1.6
9.4.3.2	Specific Requirements for Pneumatic Conveying Systems	__9.4.3.2
9.4.3.3	Specific Requirements for Dust Collection Systems	__9.4.3.3
9.4.3.4	Specific Requirements for Centralized Vacuum Cleaning Systems	__9.4.3.4
9.4.4	AMS	__9.4.4
9.4.4.1	General	__9.4.4.1
9.4.4.3	Dry AMS	__9.4.4.3
9.4.4.4	Wet AMS	__9.4.4.4
9.4.4.5	Enclosureless AMS	__9.4.4.5
9.4.4.6	AMS Locations	__9.4.4.6
9.4.4.7	AMS Clean Air Exhaust	__9.4.4.7
9.4.4.8	AMS Construction	__9.4.4.8
9.4.5	Air-Moving Devices (Fans and Blowers)	__9.4.5
9.4.6	Duct Systems	__9.4.6
9.4.7	Sight Glasses	__9.4.7
9.4.8	Abort Gates	__9.4.8
9.4.8.1	Construction	__9.4.8.1
9.4.8.2	Local Reset	__9.4.8.2
9.4.8.3	Integrity of Actuation Circuits	__9.4.8.3
9.4.9	Bulk Storage Enclosures	__9.4.9
9.4.9.1	General	__9.4.9.1
9.4.9.2	Construction	__9.4.9.2
9.4.9.3	Fixed Bulk Storage Location	__9.4.9.3
9.4.9.4	Interior Surfaces	__9.4.9.4
9.4.9.5	Access Doors and Access Openings	__9.4.9.5
	Explosion Hazards and Protection	__9.4.9.6
9.4.10	Size Reduction	__9.4.10
9.4.11	Particle Size Separation	__9.4.11
9.4.12	Pressure Protection Systems	__9.4.12

<u>Core/Fundamental Chapters</u>	<u>Subject/Title</u>	<u>Industry- or Commodity-Specific Chapters</u>
9.4.13	Mechanical Feeding Devices	__9.4.13
9.4.14	Bucket Elevators	__9.4.14
9.4.15	Conveyors	__9.4.15
9.4.16	Mixers and Blenders	__9.4.16
9.4.17	Dryers	__9.4.17
9.4.18	Transfer Points. (Reserved)	__9.4.18
9.5	Dust Control	__9.5
9.5.1	General	__9.5.1
9.5.2	Liquid Dust Suppression Methods for Dust Control	__9.5.2
9.5.3	Fans for Continuous Dust Control	__9.5.3
9.6	Ignition Source Control	__9.6
9.6.1	Retroactivity	__9.6.1
9.6.2	Hot Work	__9.56.2
9.6.3	Hot Surfaces	__9.6.3
9.6.4	Bearings	__9.6.4
9.6.5	Hazardous (Classified) Locations for Electrical Installations	__9.6.5
9.6.6	Electrostatic Discharges	__9.6.6
9.6.6.1	Conductive Equipment	__9.6.6.1
9.6.6.2	Maximum Particulate Transport Rates	__9.56.6.2
9.6.6.3	Grounding of Personnel	__9.56.6.3
9.6.6.4	Flexible Intermediate Bulk Containers (FIBCs)	__9.6.6.4
9.6.6.5	Rigid Intermediate Bulk Containers (RIBCs)	__9.6.6.5
9.6.8	Industrial Trucks	__9.6.8
9.6.9	Process Air and Media Temperatures	__9.6.9
9.6.10	Self-Heating	__9.6.10
9.6.11	Friction and Impact Sparks	__9.6.11
9.6.12	Lightning Protection	__9.6.12
9.6.13	Smoking and Vaping	__9.6.13
	Electrical Systems	__9.6.14
9.7	Pyrophoric Dusts. (Reserved)	__9.7
9.8	Explosion Prevention/Protection	__9.8
9.8.1	General	__9.8.1
9.8.2	Equipment Protection	__9.8.2
9.8.3	Equipment Isolation	__9.8.3
9.9	Fire Protection	__9.9
9.9.1	General	__9.9.1
9.9.2	System Requirements	__9.9.2
9.9.3	Fire Extinguishers	__9.9.3
9.9.4	Hose, Standpipes, Hydrants, and Water Supply	__9.9.4
9.9.5	Automatic Sprinklers	__9.9.5
9.9.6	Detection and Extinguishing Systems	__9.9.6
9.9.7	Fire Alarm Service	__9.9.7

The user of NFPA 660 should always check for fundamental requirements in the core chapters when using the industry- or commodity-specific chapters. Chapter 15 does not contain a section on AMS controls in 15.9.4.4, but that does not mean there are no requirements for them — rather 9.4.3.1.4 applies.

Even when there are not industry-specific requirements, the committee might provide extra annex material specific to their industry or commodity. For example, 14.9.3.5, Separation of Hazard Areas from Other Hazard Areas and from Other Occupancies, for wood dust does not add any additional requirements over those in fundamentals in 9.3.5, but annex material is provided in A.14.9.3.5.3 to explain a method of assessing dust accumulations in woodworking facilities.

In some of the industry- or commodity-specific sections, the requirements supersede those in the fundamentals section. An example is the compressed air blowdown method requirements in 11.8.4.2.6 superseding those in 8.4.2.6.2. In other areas of the standard, the requirements are explicitly stated to apply in addition to those in the fundamentals section. In Chapter 12, Section 12.7 specifies that the hazards analysis requirements in Section 12.7 apply in addition to those in Chapter 7. If there is any conflict between the fundamentals section and the industry- or commodity-specific sections, then Section 1.6, Conflicts, should be used to determine which requirements apply.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._41.pdf	NFPA 660 CC Note No. 41	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 41 appeared in the First Draft Report on First Revisions No.438 in NFPA 660.

Fix the following sentence in A.1.3. Requirement 9.4.4.1.1 doesn't exist anymore so this example does not work.

"Chapter 13 does not contain a section on AMS controls in 13.9.4.4, but that does not mean there are no requirements for them — rather 9.4.4.1.1, AMS Controls, applies."

Related Item

- FR No 438

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Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-61-NFPA 660-2024](#)

Statement: The sections were revised at the First Draft stage so the example is no longer correct. This text provides a new example for the user.



Correlating Committee Note No. 41-NFPA 660-2023 [Section No. A.1.3]

Submitter Information Verification

Committee: CMD-AAC

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Committee Statement

Committee Statement: Fix the following sentence in A.1.3. Requirement 9.4.4.1.1 doesn't exist anymore so this example does not work.

"Chapter 13 does not contain a section on AMS controls in 13.9.4.4, but that does not mean there are no requirements for them — rather 9.4.4.1.1, AMS Controls, applies."

FR-438-NFPA 660-2023

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

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Affirmative with Comment

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ok



Public Comment No. 83-NFPA 660-2023 [Section No. A.3.3.5]

A.3.3.5 Air-Material Separator (AMS).--

~~Examples include the following: Cyclonic separator (cyclone) —~~

~~Additional examples are enclosureless dust collectors, point-of-use dust collectors, and bin vents.~~

~~As per the definition an AMS technically could be an oversized section of ductwork (for example a drop-box) but this would not be acceptable when combustible materials are involved as accumulations in ducting or piping runs is not allowed.~~

~~Typically, an AMS used in a dust collection system will, in addition to separating the conveyed material from the air/gas stream, include the ability to collect the separated material within the AMS to allow for continuous discharge of that material. (CMD-FUN)~~

A.3.3.5.1 Cyclone (Cyclonic separator), a device utilizing centrifugal forces and geometry to separate the majority

particulates from the conveying air/gas. The efficiency of this separation is based upon many factors such as the geometry of the cyclone, material particle size distribution and density, and air/gas velocity. Generally, this unit is

considered only

used as an initial or primary separator, and additional separation devices might be needed to meet air pollution control requirements. Specially designed cyclones are able to meet air pollution control requirements, but requires special engineering data and know-how to design. (CMD-WOO)

Examples of Cyclones:

Fig A.3.3.5.1(1) low to medium efficiency Cyclone: (copy illustration from 3.3.24A here)

Fig. A.3.3.5.1(2) High

efficiency cyclone: <http://www.ssenvirotech.co.in/cyclone-separator.ht>

A.3.3.5.2 Dust collector — a device utilizing filter media to separate particulates from the conveying air/gas stream. Such devices often have automatic methods for continuous filter cleaning in order to maintain the operational efficiency of the device. Typically the filter medium is either cartridges or bags over metal cages. The operating pressure of this device, especially if operating in a negative pressure (vacuum) condition, is usually limited by its shape and physical construction.

Examples of Dust collector:

Figure A.3.3.5.2(a) Bag Collector w/ compressed air Cleaning (copy illustration from A.12.9.4.4.1(b) here)

Figure A.3.3.5.2(b) Downflow Cartridge Collector w/ compressed air Cleaning.(copy illustration from A.12.9.4.4.1(a) here).

Figure 3.3.5.2(c) Bag Collector w/ dust collecting on outside of bag and w/ high pressure cleaning.(reverse air) (copy illustration from A.12.9.4.4.1((c) here)

Figure 3.3.5.2(d) Bag Collector w/ dust collecting on inside of bag and with reverse air cleaning. Need Permission for this image.

Figure3.3.5.2(e) Envelope Bag Collector with reverse air cleaning: Need permission for this image.

A3.3.5.3 Filter receiver — similar to a dust collector but can be designed for higher vacuum and pressure applications. Dust loading is often higher than a fugitive dust collection system since these units are typically used as an AMS for a product conveying system.

A.3.3.5.4 Scrubber (Wet type AMS) — a device utilizing geometry, physical barriers, and/or absorption methods, along with a fluid (e.g., sprays and streams) to separate and collect gases and/or dusts.

Figure A.3.3.5.4(a) Scrubber with internal baffles and water sump (copy illustration from A.12.9.4.4.2(a) here)

Figure A.3.3.5.4(b) Venturi-Style Scrubber (copy illustration from A.12.9.4.4.2(d) here.

A.3.3.5.5 Electrostatic precipitator — dry or wet - a device that utilizes differences in electrical charges to remove fine particulates from the gas stream. These are commonly used for large gas flows with abrasive dusts such as fly ash or cement.

Final filter —

See Figure A.3.3.5.5 for an image of an electrostatic precipitator

Figure.3.3.5.5 Electrostatic precipitator: <https://www.britannica.com/technology/air-pollution-control/Scrubbers>

A.3.3.5.6 A final filter is a high-efficiency device commonly utilizing a pre-filter and a secondary filter within an enclosure to provide the last particulate removal step before the air is discharged from the system. Final filters are commonly used when the air stream is recirculated to occupied areas. This device can provide protection against the failure of a dust collector or filter receiver upstream of the device. A high

-

efficiency particulate air (HEPA) filter is an example. (CMD-FUN)

A.3.3.5.7 "Enclosureless AMS (dust collector) devices have a limited use and only for dust collection. These units have specific and multiple limitations when used with combustible dusts. See Industry Specific Standard chapter 13 and chapter 15 for specific information about limitation of use. (CMD-FUN)

Figure A.3.3.5.7(a) Enlosureless Dust Collector (copy illustration from A.24.9.4.4.5 here)

A.3.3.5.13 A portable vacuum cleaner is any device that allows either the direct use of a hose (with or without tool) or is used to connect to a fixed-pipe run with hose connection stations. Such a device must have: a. A method to separate the vacuumed material from the conveying air flow. This is typically either a filter or filters (depending upon size and air flow rate) or a wet separation (impact or partially submerged). It may also include a modified cannister or enclosure of the separation media. b. A device and/or method to provide conveying air flow at a sufficient vacuum level to allow use as a vacuum cleaner. This can range from a venturis connected to a compressed air supply to positive displacement, centrifugal, or regenerative vacuum blowers. Smaller units may use integral small vacuum blowers. The assemblies can range from drum cover units to large assemblies that require a forklift to move from one location to another. Combustible dust hazards and risks must be considered when using these devices. Additional information is provided in Chapter 9 of this standard

Figure 3.3.5.13(a) Portable vacuum cleaner with built-in vacuum source (AMD) Need Permission for this image.

Figure A.3.3.5.13 Portable vacuum cleaner with separate vacuum source (AMD) Need Permission for this image

Statement of Problem and Substantiation for Public Comment

The annex text for AMS definitions has been updated to reference the new subchapters under AMS and the TG has updated some of the information for each product and used some of the illustrations from other chapters.

Related Item

- FD report

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Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-86-NFPA 660-2024](#)
Statement: The definitions for various AMS types were reviewed and consolidated in one place for ease of use. They were revised to align the formats of each definition and to clarify the previous versions of the definitions.



Public Comment No. 217-NFPA 660-2024 [Section No. A.3.3.14]

A.3.3.14 Combustible Dust.

The term *combustible dust* when used in this standard includes powders, fines, fibers, flyings, etc. Combustible fibers/flyings are specifically mentioned because, while the hazard is the same, NFPA 70 and NFPA 499 treat combustible dust and combustible fibers/flyings separately in regards to establishing hazardous (classified) locations and specifying the electrical installation. Ignitable fibers/flyings, as defined in NFPA 70 and NFPA 499, do not present a flash fire or explosion hazard and are not specifically included in the definition of *combustible dust* in this standard. Ignitable fibers/flyings- flyings normally present a fire hazard, so locations are classified differently, and the electrical installation includes additional restrictions compared to combustible fibers/flyings. However, some ignitable fibers/flyings may present a flash fire or explosion hazard if suspended by a process or catastrophic event and in those cases could have similar flash fire or explosion hazards as combustible dust.

This definition also includes consideration of a process-specific oxidizing medium other than air. A larger particle size material might not present a hazard in air, yet could present a hazard in an atmosphere with increased oxygen concentration. Similarly, a combustible metal might still present a hazard in an atmosphere typically considered inert, such as CO₂ or nitrogen.

Dusts traditionally were defined as material 420 µm or smaller (i.e., capable of passing through a U.S. No. 40 standard sieve). For consistency with other standards, 500 µm (i.e., capable of passing through a U.S. No. 35 standard sieve) is now considered an appropriate size criterion. Particle surface area-to-volume ratio is a key factor in determining the rate of combustion. Combustible particulate solids with the smallest dimension more than 500 µm generally have a surface-to-volume ratio that is too small to pose a flash fire or explosion hazard. Fibers/flyings with lengths that are large compared to their diameter or thickness usually do not pass through a 500 µm sieve, yet could still pose a flash fire or explosion hazard. Many particulates accumulate electrostatic charge in handling, causing them to attract each other, forming agglomerates. Often, agglomerates behave as if they were larger particles, yet when they are dispersed they present a significant hazard. Therefore, it can be inferred that any combustible particulate solid that has the smallest dimension less than or equal to 500 µm could behave as a combustible dust if suspended in air or the process-specific oxidizer. If the smallest dimension of the particulate is greater than 500 µm, it is unlikely that the material would be a combustible dust, as determined by test. The determination of whether a sample of combustible material presents a flash fire or explosion hazard could be based on a screening test methodology such as provided in ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*. Alternatively, a standardized test method such as ASTM E1515, *Standard Test Method for Minimum Explosible Concentration of Combustible Dusts*, could be used to determine dust explosibility. Chapter 5 has additional information on testing requirements.

There is some possibility that a sample will result in a false positive in the 20 L sphere when tested by the ASTM E1226 screening test or the ASTM E1515 test. This is due to the high energy ignition source overdriving the test. When the lowest ignition energy allowed by either method still results in a positive result, the owner/operator can elect to determine whether the sample is a combustible dust with screening tests performed in a larger scale (≥1 m³) enclosure, which is less susceptible to overdriving and thus will provide more realistic results.

This possibility for false positives has been known for quite some time and is attributed to “overdriven” conditions that exist in the 20 L (5.3 gal) chamber due to the use of strong pyrotechnic igniters. The activation of the pyrotechnic igniters increases both the initial pressure and temperature in the 20 L (5.3 gal) sphere by significant amount prior to the combustion of the dust itself [Taveau, J., et al]. These new pre-existing conditions might or might not physically alter the dust being tested, depending on its physical properties. For material with low flash point, the conjectured mechanism is that the pyrotechnic igniters are able to induce sufficient sublimation and vapor formation to change the combustion mechanism scenario from combustion of solid particles (i.e., dust) to combustion of a mixture of particles and a flammable gas (or vapor). Authors of “Igniter-induced hybrids in the 20-L sphere,” *Journal of Loss Prevention in the Process Industries* [Taveau, J., et al] proposed to call this phenomenon an *igniter-induced hybrid*. Whereas in a 1 m³ (35.3 ft³) chamber the effect disappears after the initial kernel propagates, in a 20 L (5.3 gal) sphere these effects persist throughout the flame propagation, leading to an increased reactivity of the tested material. Authors of Taveau, J., et al expect that the probability of an igniter-induced hybrid increases as the flash point and/or the MAIT of the powder in question decreases. For that reason, the reference method for explosibility testing is based on a 1 m³ (35.3 ft³) chamber, and the 20 L chamber test method is calibrated to produce results comparable to those from the 1 m³ (35.3 ft³) chamber for most dusts.

NFPA 68 also recognizes this problem and addresses it stating that “the 20 L test apparatus is designed to simulate results of the 1 m³ chamber; however, the igniter discharge makes it problematic to determine *K_{St}* values less than 50 bar-m/sec.

Where the material is expected to yield *K_{St}* values less than 50 bar-m/sec, testing in a 1 m³ chamber might yield lower values.”

Any time a combustible dust is processed or handled, a potential for a flash fire or explosion exists. The degree of flash fire or explosion hazard varies, depending on the type of combustible dust and the processing methods used.

Refer to A.7.2.1 for a description of the conditions required for a combustible dust flash fire or explosion to occur.

Evaluation of the hazard of a combustible dust should be determined by the means of actual test data. Each situation should be evaluated and applicable tests selected. The following list represents the factors that are sometimes used in determining the flash fire and explosion hazards of a dust:

- (1) MEC
- (2) MIE
- (3) Particle size distribution
- (4) Moisture content as received and as tested
- (5) Maximum explosion pressure at optimum concentration
- (6) Maximum rate of pressure rise at optimum concentration
- (7) *K_{St}* (normalized rate of pressure rise) as defined in ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*
- (8) Layer ignition temperature

- (9) Dust cloud ignition temperature
- (10) Limiting oxidant concentration (LOC) to prevent ignition
- (11) Electrical volume resistivity
- (12) Charge relaxation time
- (13) Chargeability

It is important to keep in mind that as a particulate is processed, handled, or transported, the particle size generally decreases due to particle attrition. Therefore, it is often necessary to evaluate the characteristics of the particulate at multiple points along the process. Where process conditions dictate the use of oxidizing media other than air, which is nominally taken as 21 percent oxygen and 79 percent nitrogen, the applicable tests should be conducted in the appropriate process-specific medium.

The definition of *combustible dust* focuses on flash fire and explosion hazards, but fires in piles or layers of combustible particulate solids are also a concern that is addressed in this standard. A combustible dust that poses a flash fire or explosion hazard could also pose a fire hazard when in the form of a settled accumulation. This can also be the case for combustible particulate solids with a minimum dimension greater than 500 µm. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

Identifying that some ignitable fibers/flyings may prevent a flash fire and explosion hazard if suspended by a catastrophic event or if intentionally suspended by a process.

Related Item

- First Revision No. 19

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-62-NFPA 660-2024](#)

Statement: Identifying that some ignitable fibers/flyings may present a flash fire and explosion hazard if suspended by a catastrophic event or if intentionally suspended by a process, and highlighting the difference between combustible and ignitable fibers/flyings.

**Public Comment No. 244-NFPA 660-2024 [Section No. A.3.3.28.1]****A.3.3.28.1 – Dust Explosion Hazard Area. –**

A dust explosion hazard requires that a dust deflagration be confined within an enclosure providing for the accumulation of a damaging level of pressure. See NFPA 68 for evaluating strength of enclosures. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This is replaced by A.3.3.38.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new Appendix A	

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 246-NFPA 660-2024 [Section No. A.3.3.37]

A.3.3.37 – Dust Explosion Hazard. –

A dust explosion hazard requires that a dust flash fire be confined within an enclosure providing for the accumulation of a damaging level of pressure. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This has been replaced by A.3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
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• This is a revision to the new Appendix A	

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Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 218-NFPA 660-2024 [Section No. A.3.3.45]****A.3.3.45 – Fibers/Flyings. –**

Fibers and flyings are characterized by a large ratio between the largest and smallest characteristic dimension (length:width, length:diameter, or length:thickness). Examples of fibers/flyings include flat platelet-shaped particulate, such as flakes, and fibrous particulate, such as particle board core material. The 500 µm particle size criterion in the definition differentiates fibers and flyings from dusts. Many accumulations of fibers and flyings are composed of a range of particle sizes and can contain a mixture of fibers/flyings and dust. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

A related comment 199 recommends to remove the definition of Fibers/Flyings, so the explanatory text should be reverted to its original location in the annexes for 3.3.45.1 and 3.3.45.2.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 199-NFPA 660-2024 [Section No. 3.3.45]	
Public Comment No. 220-NFPA 660-2024 [Section No. A.3.3.45.1]	

Related Item

- 3.3.45

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Submittal Date: Wed Jan 03 14:10:10 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-12-NFPA 660-2024
Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.

**Public Comment No. 220-NFPA 660-2024 [Section No. A.3.3.45.1]****A.3.3.45.1 Combustible Fibers/Flyings.**

Section 500.5 of *NFPA 70* defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitable fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 µm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 µm sieve, yet when tested could potentially be determined to be explosible.

The typical test methods for evaluating an explosible mixture are ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1, *Explosion Protection Systems — Part 1: Determination of Explosion Indices of Combustible Dusts in Air*, or ISO/IEC/UL 80079-20-2, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitable fiber/flying, as defined in 3.3.45.2. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [499-2024]

While this standard includes larger yet still hazardous materials as a subset of combustible dust, *NFPA 70* addresses them separately for purposes of defining the appropriate electrical classification. Although the hazard is the same when dispersed in a cloud, the electrical installation to prevent ingress of combustible fibers/flyings is different. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This comment is consistent with comment 199 to revert the definition of combustible fibers/flyings, as well as its annex material, to the TIA version.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 218-NFPA 660-2024 [Section No. A.3.3.45]	
<u>Related Item</u>	
• 3.3.45, 3.3.45.1	

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-12-NFPA 660-2024
Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.

**Public Comment No. 221-NFPA 660-2024 [Section No. A.3.3.45.2]****A.3.3.45.2 Ignitable Fibers/Flyings.**

Section 500.5 of *NFPA 70* defines a Class III location as one where ignitable fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. This description addresses fibers/flyings that do not present a flash fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. [499, 2021]- ~~Where a process-specific oxidizing medium or elevated temperature process is present, ignitable fibers can produce a flash fire or explosion hazard.~~

In this document the zone classification system includes ignitable fibers/flyings as a fire hazard in a layer, which is not addressed in the IEC zone system (see IEC 60079-10-2, *Explosive atmospheres — Part 10-2: Classification of areas — Explosive dust atmospheres*). Where these are present, the user could also consider installation in accordance with Article 503 of *NFPA 70*. [499, 2021]- { _

Where a process-specific oxidizing medium or elevated temperature process is present, ignitable fibers can produce a flash fire or explosion hazard. { CMD-FUN)

Statement of Problem and Substantiation for Public Comment

Relocating the verbiage added by the committee to the end of the prior TIA annex text consolidates the extracted definition's annex material for consistency with NFPA 499 and NFPA 70.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
<u>Public Comment No. 199-NFPA 660-2024 [Section No. 3.3.45]</u>	
<u>Related Item</u>	
• 3.3.45.2	

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-12-NFPA 660-2024
Statement: The definitions were reverted to retain consistency with those in the NEC and NFPA 499.

The Technical Committee intends to request a Fire Protection Research Foundation project to review the definitions and potentially propose a method to better characterize ignitable fibers/flyings.



Public Comment No. 242-NFPA 660-2024 [Section No. A.3.3.47]

A.3.3.47 – Fire Hazard. –

In the context of this standard, the term *fire*, absent a modifier such as *flash fire*, is intended to refer to the combustion of settled layers or piles of combustible particulate solids. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This section has been replaced by a new A.3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new Appendix A	

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Submittal Date: Thu Jan 04 12:03:59 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 247-NFPA 660-2024 [Section No. A.3.3.51]

A.3.3.51 – Flash Fire. –

A flash fire requires an ignition source and an atmosphere containing a flammable gas, a flammable vapor, or finely divided combustible particles (e.g., coal dust or grain) having a concentration sufficient to allow flame propagation. Flash fires can also involve hybrid mixtures. Flammable gas, flammable vapor, and dust flash fires typically generate temperatures from 1000°F to 1900°F (538°C to 1038°C). The extent and intensity of a flash fire depend on the size and concentration of the gas, vapor, or dust cloud. When ignited, the flame front expands outward in the form of a fireball. The resulting effect of the fireball's energy with respect to radiant heat significantly enlarges the hazard areas around the point of ignition. Refer to A.7.2.1 for a description of the conditions required for a combustible dust flash fire to occur. (CMD-FUN)

Statement of Problem and Substantiation for Public Comment

This is replaced by A.3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a revision to the new Appendix A	

Submitter Information Verification

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 137-NFPA 660-2024 [New Section after A.3.3.105]****A.3.3.104 Qualified Person**

Someone who is qualified to perform or lead a DHA has performed all the aspects of several DHAs associated with the affected industry or type of combustible dust(s). This individual has a working understanding of the intent of the numerous combustible dust standards and can recognize safe and cost-effective solutions that fit each facility's needs. This specialized knowledge and experience that comprise an individual's qualifications are gained from months to years of work assessing and mitigating complex combustible dust fire and explosion scenarios. However, this expertise cannot be gained by merely observing a DHA, reading standards, or attending a training course. Simply being a certified environmental, safety, and health (EHS) professional (e.g., CIH, CSP, etc.) or licensed professional engineer (PE) in and of itself also does not mean an individual possess the necessary skills and required knowledge to perform a DHA. The complexities associated with analyzing the combustible dust hazards in processes, equipment, and building compartments demand specialized expertise beyond just certifications and licenses. Because the characteristics of being qualified and unqualified are dependent on the type of combustible dust, an individual may also only be qualified to perform a DHA for a specific type of combustible dust. Failure to acknowledge one's qualifications or lack thereof could cause fire and explosion hazards to be misidentified, incorrectly mitigated, or worse both.

Statement of Problem and Substantiation for Public Comment

Some of the original concerns with the qualified person definition submitted during the First Draft were addressed by the changes to Section 7.2.2. However, additional annex material is still needed to clarify who may or may not be qualified to perform a DHA. For example, pool cleaners, auto mechanics, environmental stack testers, architects, industrial hygienists, sprinkler designers, structural engineers, and other unqualified individuals have performed recent "DHAs." In addition to violating their licenses and certifications by working outside their core competencies, the "DHAs" performed inexperienced individuals do not adequately identify and address all the potential combustible dust hazards associated with equipment and building compartments. These unqualified individuals have also been a contributing factor to at least 7 fires and deflagrations that I have investigated in the last four years.

Similar annex material was submitted during the First Draft, but this proposed annex material has been shortened as requested by the Committee during the First Draft stage.

Related Public Comments for This Document**Related Comment**

Public Comment No. 184-NFPA 660-2024 [Section No. 12.15.5.4]

Relationship**Related Item**

- FR-38, PI-485

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-63-NFPA 660-2024](#)

Statement: This additional annex material clarifies who may or may not be qualified to perform a DHA.

**Public Comment No. 249-NFPA 660-2024 [Section No. A.4.1]****A.4.1**

Combustible particulate solids and dust hazard identification, assessment, and mitigation should address known hazards, including the following:

- (1) Reactivity hazards (e.g., binary incompatibility or water reactivity)
- (2) Smoldering fire in a layer or a pile
- (3) Flaming fire of a layer or a pile
- (4) Flash fire (~~combustion in suspended dust cloud~~)
- (5) ~~Explosion rupturing equipment~~
~~Explosion rupturing rooms or buildings~~
- (6) local area flash fire hazard, building compartment flash fire hazard
- (7) Equipment explosion hazard
- (8) Building explosion hazard

Statement of Problem and Substantiation for Public Comment

This change is tied to the new proposed definitions in 3.3.38

Related Public Comments for This Document**Related Comment**

Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]

Relationship**Related Item**

- This is a revision to the new A.4.1

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Submission Date: Thu Jan 04 14:24:46 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected

Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 255-NFPA 660-2024 [Section No. A.7.2.1]

A.7.2.1

This standard relies on the determination of where a fire, flash fire (local/building compartment), or explosion (building/equipment) hazard exists. The DHA should consider the conditions that are required for these events.

For a fire in settled solids to occur, there needs to be all of the following:

- (1) A combustible particulate solid in sufficient quantity for a flame to propagate
- (2) Air or other oxidizing atmosphere
- (3) A competent ignition source applied to the combustible particulate solid

See Figure A.7.2.1(a).

For either a local area flash fire or a building compartment flash fire to occur, there needs to be all of the following:

- (1) A combustible particulate solid of sufficiently small particle size either contained in equipment or accumulated on building elements
- (2) Air or other oxidizing atmosphere
- (3) A means for suspending the combustible particulate solid at a sufficiently high concentration
- (4) A competent ignition source applied to the suspension of combustible particulate solids where the concentration is sufficient for flame propagation

See Figure A.7.2.1(b). For an explosion to occur, a fifth factor must be present — that is, the flash fire must be sufficiently confined (in equipment or a building) to allow the accumulation of a damaging level of pressure. See Figure A.7.2.1(c).

Figure A.7.2.1(a) Fire Requirements.

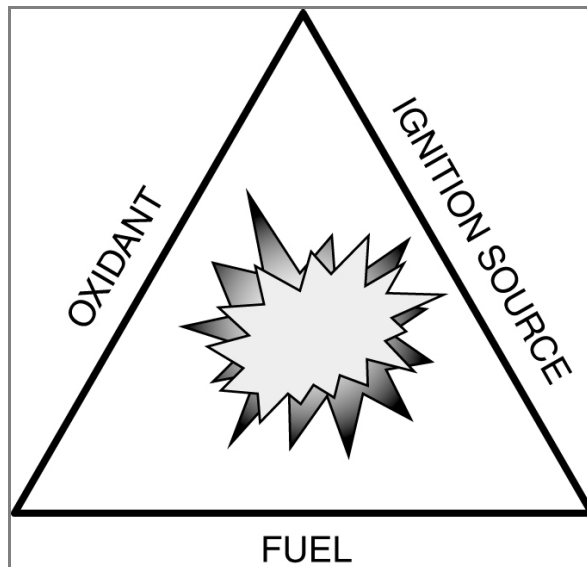


Figure A.7.2.1(b) Flash Fire Requirements.

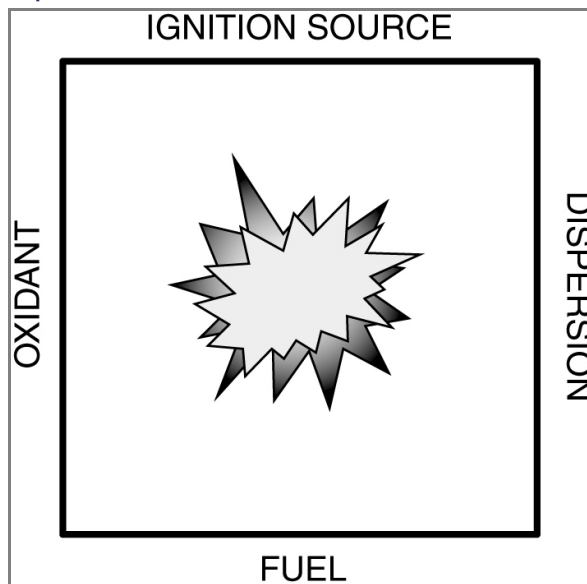
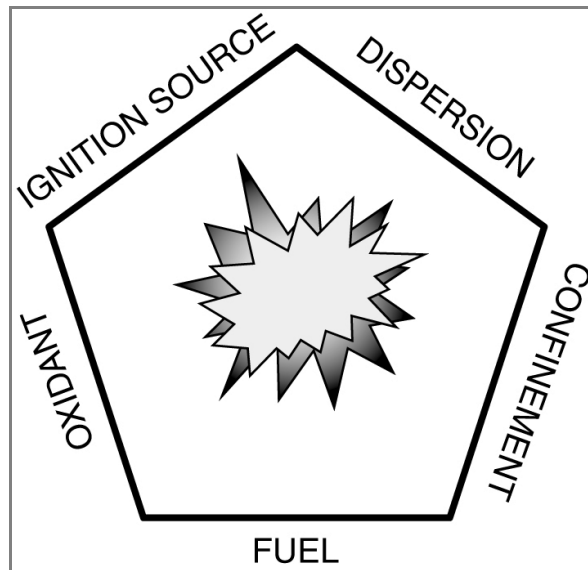


Figure A.7.2.1(c) Explosion Requirements.



Often, dust explosions occur in a series. Primary explosions lead to secondary explosions, usually fueled by accumulated fugitive dust that has been suspended either by being dislodged by the shaking of the building or equipment or by entrainment by the pressure front caused by the previous explosion.

The majority of the property damage and personnel injury can be due to these secondary explosions that result from the fugitive dust accumulations within the building or process compartment. The elimination of accumulated fugitive dust is critical and is often the single most important criterion for a safe workplace.

While the primary focus of the DHA is the hazards associated with combustible dusts and particulate solids, there are other physical and health hazards to consider when conducting the DHA such as toxicity and reactivity of the particulate solids with water. There can also be fire, flash fire, or explosion hazards associated with ignitable (flammable or combustible) liquids as part of the process covered by this standard. Note that NFPA 30 provides additional requirements for ignitable (flammable or combustible) liquids hazards.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new definitions provided in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to the new Section A.7.2.1	

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Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 197-NFPA 660-2024 [New Section after A.8.6.2.1]****Annex AA Guide for Computing Thermal Dose to Personnel from Flash Fires and Building Compartment Deflagrations**

[see attached MSWord file]...

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Annex_AA_Guide_for_Computing_Thermal_Dose_to_Per_from_Flash_Fires_and_Bldg_Comp_Def_FD_JC122923.docx	proposed text for Annex AA	

Statement of Problem and Substantiation for Public Comment

8.6.1 establishes a requirement to protect employees from the effects of a deflagration. While FRG is available for protection from flash-fires of limited size and duration, no means has been provided by the proposes standard for distinguishing between flash fires for which protection is available, from building compartment deflagrations for which the thermal dose exceeds the capabilities of FRG designed per NFPA 2112. The proposed new Annex AA provides one means by which the operator can determine if FRG is sufficient to achieve the personnel safety objectives for the facility.

Related Item

- 8.6.1

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-64-NFPA 660-2024

Statement: 8.6.1 establishes a requirement to protect employees from the effects of a deflagration. While FRG is available for protection from flash-fires of limited size and duration, no means has been provided by the proposed standard for distinguishing between flash fires for which protection is available, from building compartment deflagrations for which the thermal dose exceeds the capabilities of FRG designed per NFPA 2112. The new annex provides one means by which the operator can determine if FRG is sufficient to achieve the personnel safety objectives for the facility.

Annex AA Guide for Computing Thermal Dose to Personnel from Flash Fires and Building Compartment Deflagrations

AA.1 NFPA 660 uses the determination of the existence of a “flash-fire hazard” as the trigger for the requirement for the use of FRG to protect personnel from that hazard. Section 8.6.1 states: “Flame resistant garments (FRG) designed in accordance with NFPA 2112 shall be permitted to be used as part of the personnel protection strategy against flash-fire exposures, only.” This implies that there can be situations where the protective capabilities of FRG will not be capable of achieving the personnel protection objective. Section 8.6.2 states: “Flame resistant garments shall not be considered as a safeguard against building compartment deflagration hazards or explosion hazards.” This language effectively establishes that those events that cannot yield a thermal dose greater than 252 kJ/m^2 , that resulting from a radiant flux of 84 kW/m^2 for a duration of 3 seconds, as a “flash-fire” and those that can yield more than 252 kJ/m^2 as a “building compartment deflagration” (BCD).

AA1.1 To illustrate this distinction, consider these two fire scenarios. First, an ignition of a 2.0 m^3 vapor cloud consisting of cyclohexane (a common organic solvent) that has been pushed out of the ullage space (the space above the settled material in a container) of a 2.0 m diameter mixer, when polymeric resin was added. This has been customarily referred to as a “flash-fire” since the 1970s. Second, the propagation of a dust deflagration involving wood dust, from a dust suspension (cloud) that extends from floor to ceiling at one end of the building compartment that is 20 m wide, 50 m long and 5 m high, referred to as a building compartment deflagration (BCD). These are illustrated below.



The Two Scenarios of “Flash-Fire” and “Building Compartment Deflagration” (BCD)

AA.1.2 There are a number of computational methods for predicting the radiant flux impinging on a target as a function of a given fire geometry.¹

These calculations have been developed primarily for hydrocarbon pool fires, and for flammable gas and vapor cloud fires. Where commonly encountered particulates like agricultural, forest, animal-derived and plastic products are concerned, the combustion chemistries are sufficiently similar to allow the use of those calculations to model a dust deflagration also. Metallic particulates burn with sufficiently different chemistries that corrections should be made to the computational models before use.

To calculate the incident radiant flux rigorously, we must quantify a number of parameters including the emissivity of the flame, the emissivity of the target occupant, the exact distances between the fire and the target, transmittance of the atmosphere, to name just a few.

The calculation can be simplified by assuming that the flames of both fire events are optically dense radiators. In reality they are. This allows us to base the calculations on the radiating area of the flame rather than on the actual flame volume and then making a second correction to subtract the emissions that are not directed towards the target. We can also use a point-source equivalence to simplify the geometry. But when we do so we lose the geometric continuity between the two cases. As long as we make the same simplifications to both scenarios, the relative radiant intensity ratio will stay constant.

For a hypothetical point-source radiator the incident radiant flux, q , impinging on a target can be predicted using the relation:²

$$q = \tau X_r (Q/4\pi L^2) \cos\Theta \quad \text{AA 1}$$

where τ = Atmospheric transmittance (unitless)
 X_r = Radiative Fraction of the heat release. %
 Q = Heat release rate, kW
 L = Distance from center of fire ball to target, m

The radiant flux has units of kW/m². The $(4\pi L^2)$ term is just the surface area of a sphere that is L meters from the central radiating point.

AA.1.3 For the vapor deflagration above a mixer scenario, the point-source model does not introduce an error and we have a deflagration fire ball that is a 2.0-meter diameter sphere. Since the person is 1.0 m from the edge of the mixer and the mixer is 2 meters in diameter, the person is 2 meters from the center of the deflagration but only 1.0 m from the flame surface. The flame volume is 4.2 m³. At a density of 1.225 kg/m³, a 4.2 m³ volume of air has a mass of 5.13 kg. At 21% O₂ by weight there is a mass of 1.08 kg of oxygen available for combustion. At 13.1 kJ/gO₂ the heat release in the vapor cloud will be limited to approximately 14.12 MJ. This is a bounding value as it provides the maximum amount of energy that can be derived from the available oxygen in the air. In real deflagrations the value will be somewhat smaller due to incomplete combustion.

If this deflagration propagates across the cloud in 1.0 seconds the power dissipation will be approximately 14.12 MW. The value for the distance term, L , is the distance from the center of the deflagration to the target, the operator, approximately 2 m. When we use a transmittance coefficient, τ , of 1, radiant fraction, X_r , of 0.35 and incidence angle, Θ , of 90°, we get an estimated radiant flux of 0.0983 MW/m² or 98.3 kW/m². This incident flux intensity is integrated over the exposure time to obtain the energy dose. In this scenario we assumed a 1.0 second long, momentary constant magnitude radiant flux. The thermal dose would be 98.3 kJ/m². There is no persisting radiant flux subsequent to the initial deflagration such as that which would occur if the upper half of the building compartment were filled with hot combustion product gases. The thermal dose is approximately 100kJ. If the operator was 1.5 m from the center of the deflagration, her/his thermal dose would be 174 kW/m².

The acceptance criterion in NFPA 2112 is 84 kW/m² for 3 seconds.³ This equates to a thermal dose of 252 kJ. The values calculated from the mixer scenario are of the same order of

magnitude as the value used by NFPA 2112. Thus, it appears that this fire scenario is close to that which the Technical Committee on Flash Fire Protective Garments was contemplating when it wrote NFPA 2112 and NFPA 2113.^{4, 5} Consequently, we can conclude that flame resistant garments complying with NFPA 2112 would provide the desired level of protection from injury, except to the hands and head, from the deflagration event in the first scenario. Good!

AA.1.4 For the second scenario we must use the large-scale radiant flux data because the radiator is much larger in surface area than the target. This introduces an error of increasing magnitude as the flame gets closer to the target. For large scale radiation flames the value of 350 kW/m^2 for the radiant flux is often used.⁶ This value has been experimentally derived.

Let's compare the radiant flux on the occupant in this scenario. To do this we need to redraw the sketch. It is shown below. A dust suspension occurs at the left end of the building compartment. The building compartment is 20 m wide, 50 m long and 5 m high. The occupant is 5 m from the right end. And we put two 12 ft. by 12 ft. roll-up doors at the right end that are open at the time of the event to prevent the rupture of the room walls.



Figure AA.1: The Building Compartment Deflagration Scenario

At the instant of ignition, the deflagration flame front begins expanding through the fuel/air suspension. The velocity of the flame front expansion through the suspension can be computed from the numerical value of the K_{St} of the dust. But the combustion product gas also expands, pushing the flame front from behind. The actual velocity of the flame front is the sum of these two components.

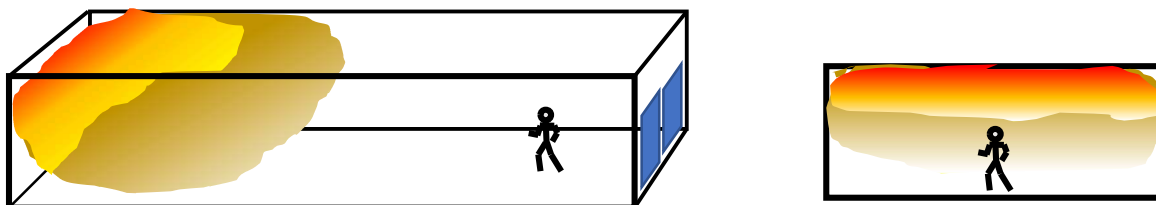


Figure AA.2 The Deflagration Flame 0.5 Seconds after Ignition

The left image depicts the initial expansion of the deflagration across the building compartment. The right image depicts the radiating area. We use the simplified point-source, optically dense radiator model used in the first scenario and a uniform radiant intensity per unit area, and the average distance from the front surface of the flame to the occupant in the calculation.

The radiating area is 20 m by about 2.0 m high for a radiating area of 40 m². Using the radiant flux per unit area of 350 kW/m², this yields an estimated radiant power of 14 MW. Initially the front surface of the deflagration flame-front is 5 m from the left wall while the occupant is 5 m from the right wall, putting 40 m between them.

The resulting radiant intensity at the occupant can be calculated with the inverse Square Law.

$$q = \frac{Q}{d^2} \quad \text{AA2}$$

Using the value of 14 MW for Q and 40 m for the distance, d, in the Inverse-Square Law for radiant flux intensity yields a calculated incident radiant flux, q, of 8.75 kW/m² on the target occupant. This is less than the radiant intensity criterion in NFPA 2112 of 84 kW/m².

Thermal dose is the product of radiant intensity multiplied by exposure duration time. Using a simple step-wise summation instead of an integration, we can estimate at the end of the first ½ second time interval the thermal dose for the occupant is 4.4 kJ/m². If the deflagration was limited to this size and 3 seconds in duration, one could expect the injury to the occupant equipped with FRG in accordance to NFPA 2113 to be limited to second degree burns except for the hands and head.

Unfortunately, in a propagating building compartment deflagration (BCD) the radiating surface is moving across the building compartment as it consumes the suspended fuel. As the deflagration flame front propagates through the dust cloud towards the occupant, the front surface of the flame front is traveling at a rate that is the sum of the flame speed, S_u , and the velocity induced by the expansion of the combustion product gases pushing the whole dust cloud towards the occupant. For sake of simplicity in this this hypothetical example we assign an expansion velocity of 10 m/sec. At 1.0 seconds after ignition, the flame front has moved 5 meters closer to the occupant and the flame has expanded to an area of 20 m by 4 m. The radiating area is now 80 m². Using the radiant flux per unit area of 350 kW/m², the total radiant power is approximately 28 MW.

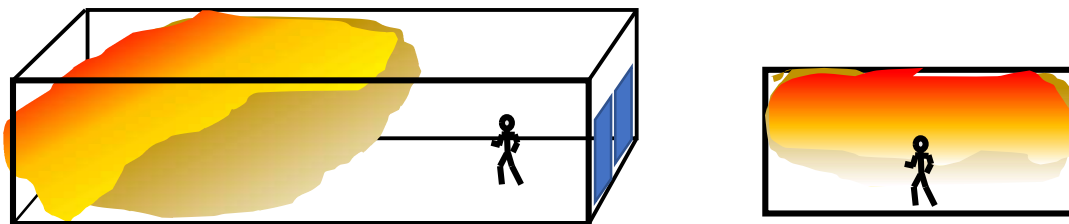


Figure AA.3 The Building Compartment Deflagration Scenario 1.0 Seconds after Ignition

Since the front surface of the flame now averages 10 m from the left wall the separation has decreased to 35 m and the radiant intensity on the occupant is now 22.9 kW/m².

For this hypothetical example we use a simple step-wise summation in lieu of an integration. (This leads to an over-estimation of the accumulated dose in the initial stages of the event but

the error diminishes in importance as the deflagration propagates across the room.) We can estimate at the end of the second $\frac{1}{2}$ -second time interval the accumulated thermal dose for the occupant is approximately 15.85 kJ/m^2 .

Another 0.5 seconds later, the flame front has advanced another 5 m, reducing the distance between the emitter and the target to 30 m and the radiating surface now extends from floor to ceiling. Now the radiating area is 100 m^2 for a total radiant power of 35 MW. Since the distance has decreased to 30 m the radiant intensity on the occupant is now 38.9 kW/m^2 . At the end of the third $\frac{1}{2}$ -second interval the accumulated thermal dose for the occupant is now approximately 35.3 kJ/m^2 .

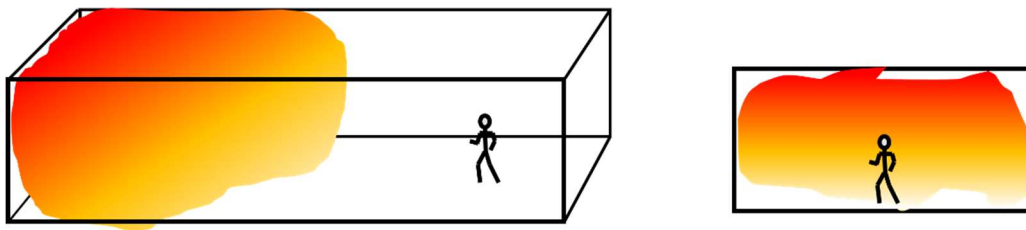


Figure AA.4 The Building Compartment Deflagration Scenario 1.5 Seconds after Ignition

After another 0.5 seconds, 2.0 seconds after ignition, the radiant intensity of the deflagration flame front has not increased as it is limited to the cross-sectional area of the room. But the flame surface is another 5 m closer, now 25 m from the occupant. The radiant intensity impinging upon the occupant target is now 56 kW/m^2 . At the end of the fourth $\frac{1}{2}$ -second time interval, 2.0 seconds after ignition, the accumulated thermal dose for the occupant is approximately 63.3 kJ/m^2 .

At 2.5 seconds after ignition, the deflagration flame front has moved 5 m closer to the occupant for a separation distance of 20 m. The radiant intensity impinging upon the occupant is now 87.5 kW/m^2 . At the end of the fifth $\frac{1}{2}$ -second time interval, 2.5 seconds after ignition, the accumulated thermal dose for the occupant is approximately 107.1 kJ/m^2 .

If the deflagration flame front continues to advance at the rate of 10 m/sec, at 3 seconds after ignition, it would have advanced an additional 5 m and the separation distance between the front of the deflagration flame front and the occupant is 15 m. Due to the smaller separation distance the Inverse Square Law predicts the radiant intensity on the occupant will now be 155.6 kW/m^2 . At 3.0 seconds after ignition the simple step-wise summation yields an accumulated thermal dose to the occupant of 184.9 kJ/m^2 .

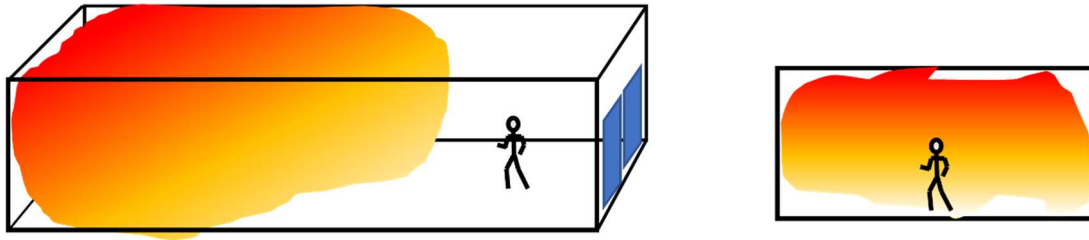


Figure AA.4 The Building Compartment Deflagration Scenario 3.0 Seconds after Ignition

In another 0.5 seconds, 3.5 seconds after ignition, the separation distance has diminished to 10 m while the total radiant power is still 350 kW/m² and has remained limited by the room cross-sectional area. Since the front surface of the flame is now only 10 m from the occupant the radiant intensity on the occupant will now be 350 kW/m². This intensity multiplied by the ½ second exposure time adds another 175 KJ/m² to the accumulated dose, bringing the total to 359.9 kJ/m² for the accumulated thermal dose to the occupant. This accumulated dose exceeds the performance criteria in NFPA 2112, yet the flame front is still advancing towards the occupant. These calculations are summarized below.

t (sec)	A (m ²)	Q (MW)	D (m)	Q (kW/m ²)	ΣTD (kJ/m ²)
0.5	40	14	40	8.75	4.4
1.0	89	28	35	22.8	15.9
1.5	100	35	30	38.9	35.3
2.0	100	35	25	56.0	63.3
2.5	100	35	20	87.5	107.1
3.0	100	35	15	155.6	184.9
3.5	100	35	10	350	359.9

Table AA.1: Summary of Calculated Thermal Dose for the BCD Scenario

The deflagration flame front has not yet reached the occupant yet the occupant's thermal dose has exceeded the performance criterion established by NFPA 2112. If there is sufficient accumulated fugitive dust in the building compartment to continue the deflagration propagation the flame will soon engulf the occupant. Once flame impingement occurs, the heat transfer from the flame gases to a target becomes dominated by convective heat transfer. The influx rate of heat increases enormously. The occupant is subject to catastrophic injury and quite probably death.

Furthermore, if the building compartment does not rupture, once the deflagration flame has run its course, the hot combustion product gas, some of which is carbon monoxide, will be trapped beneath the ceiling. This creates a persisting radiant heat source, as well as a potentially toxic atmosphere.

AA.2.0 Assessing Thermal Dose for Selection of Personnel Protection Strategy

The hazard assessment necessitates quantifying the reasonable worst-case deflagration size and the reasonable worst-case personnel proximity to the deflagration in order to calculate the probable worst-case thermal dose. The probable worst-case thermal dose is compared to the criteria in NFPA 2112 of 252 kJ/m^2 . If the probable worst-case thermal dose to employees in the hazard area exceeds the NFPA 2112 criteria, FRG cannot be relied upon as the sole consequence-management strategy.

Thermal dose is proportional to the total radiant intensity multiplied by the exposure time. Most of the time the radiant intensity varies as a function of time. Either the deflagration is expanding or decaying. When evaluating deflagration scenarios, the duration of the flame is usually limited to periods of 1 to 5 seconds and the intensity is assumed to be constant over that time period.

The incident radiant intensity is also dependent upon the distance between the radiator and the target. As shown in the second scenario in AA 1.4, when the flame front advances towards the occupant the incident radiant intensity increases proportional to the inverse-square of the distance. A hazard assessment is based upon the minimum separation distance between the radiator (flame) and the target (occupant). A thermal dose in excess of the 252 kJ/m^2 (84 kW/m^2 for 3.0 seconds) criterion can be the result of a large radiator at large separation distance, a small radiator at a small separation distance or a combination between those two extremes.

Finally, the thermal dose is dependent upon the fuel. While ignitable gases, vapors and non-metallic dusts yield roughly equivalent deflagration flame temperatures, combustible metal particulates burn at much higher temperatures, necessitating much greater separation distances.

AA 2.1 Thermal Dose Estimates for Deflagrations Involving Ignitable Gases, Vapors and Non-metallic Particulate Solids.

The first step in determining the personnel protection strategy is to establish the design deflagration. Deflagration flames usually take on a spherical form until constrained by enclosure interior surfaces such as process equipment, walls, ceilings and floors. Since flames are optically dense radiators, the radiating area has an approximately circular shape with diameter equal to the diameter for the spherical flame volume. Table AA.2.1. provides estimated deflagration radiant flux using the 350 kW/m^2 factor for ignitable gases, vapors and combustible particulate solids used for estimating design deflagration.

Volume, m ³	Diameter, m	Radiating Area, m ²	Radiant Flux, kW
1.0	1.24	1.21	424
2.0	1.56	1.92	672
3.0	1.79	2.52	880
4.0	1.97	3.05	1066
5.0	2.14	3.53	1237
7.5	2.42	4.63	1621
10	2.68	5.61	1963
15	3.06	7.35	2572
20	3.36	8.90	3115
25	3.64	10.32	3614
30	3.84	11.66	4080

Table AA2.1: Estimated Radiant Flux from Deflagrations of Given Volumes

The next step is to compute the radiant intensity at the target for the computed radiant flux as a function of distance between the front surface of the deflagration flame volume and the target (occupant). This is a simple inverse-square calculation from:

$$q = Q/d^2 \quad \text{AA3}$$

where q = incident radiant intensity, kW/m²
 Q = emitted radiant flux, kW
 d = distance, m

The incident radiant intensity, kW/m², is then multiplied by the exposure time, in seconds, to obtain the thermal dose in kJ/m². Where the computed thermal dose exceeds the NFPA 2112 criterion of 252 kJ/m² (84 kW/m² for 3 seconds duration) personnel protection in excess of that provided by FRG designed in accordance with NFPA 2112 is necessary. Lines have been superimposed on the table below, dividing the 1.0 second, 2.0 second and 3.0 second exposure time boundaries.

Incident radiant intensities are calculated for separation distances incrementing in 1.0 m steps up to 10 m separation distance. For distances between steps Equation AA3 is used to solve for incident radiant intensity, q .

Flame Volume, m ³	Emitted Radiant Flux, kW/m ²	Incident Radiant Intensity, kW/m ² , at Distance, m											
		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10	15	20
1.0	434	434	108	48.2	27.1	17.4	12.1	8.86	6.78	5.36	4.34	1.93	1.09
2.0	672	672	168	74.7	42.0	26.9	18.7	13.7	10.5	8.30	6.72	2.99	1.68
3.0	880	880	220	97.8	55.0	35.2	24.4	18.0	13.8	10.9	8.80	3.91	2.20
4.0	1066	1066	267	118	66.6	42.6	29.6	21.8	16.7	13.2	10.6	4.73	2.67
5.0	1237	1237	309	37	77.3	49.5	34.4	25.2	19.3	15.3	12.4	5.50	3.09
7.5	1621	1621	405	180	101	64.8	45.0	33.1	25.3	20.0	16.2	7.2	4.05
10	1963	1963	491	218	123	78.5	54.5	40.1	30.7	24.2	19.6	8.72	4.91
15	2572	2572	643	285	160	103	71.4	52.5	40.2	31.8	25.7	11.4	6.43
20	3115	3115	779	346	194	125	86.5	63.6	48.7	38.5	31.2	13.8	7.79
25	3614	3614	904	402	226	145	100	73.8	56.5	44.6	36.1	16.1	9.04
30	4080	4080	1020	453	255	163	113	83.3	63.8	50.4	40.8	18.1	10.2

Thermal Dose Exceeds
Capabilities of FRG

Thermal Dose within the
Capability Limit for FRG

Table AA 2.2: Fire Size Versus Separation Distance for 1.0 Second Exposure

Flame Volume, m ³	Emitted Radiant Flux, kW/m ²	Incident Radiant Intensity, kW/m ² , at Distance, m											
		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10	15	20
1.0	434	434	108	48.2	27.1	17.4	12.1	8.86	6.78	5.36	4.34	1.93	1.09
2.0	672	672	168	74.7	42.0	26.9	18.7	13.7	10.5	8.30	6.72	2.99	1.68
3.0	880	880	220	97.8	55.0	35.2	24.4	18.0	13.8	10.9	8.80	3.91	2.20
4.0	1066	1066	267	118	66.6	42.6	29.6	21.8	16.7	13.2	10.6	4.73	2.67
5.0	1237	1237	309	137	77.3	49.5	34.4	25.2	19.3	15.3	12.4	5.50	3.09
7.5	1621	1621	405	180	101	64.8	45.0	33.1	25.3	20.0	16.2	7.2	4.05
10	1963	1963	491	218	123	78.5	54.5	40.1	30.7	24.2	19.6	8.72	4.91
15	2572	2572	643	285	160	103	71.4	52.5	40.2	31.8	25.7	11.4	6.43
20	3115	3115	779	346	194	125	86.5	63.6	48.7	38.5	31.2	13.8	7.79
25	3614	3614	904	402	226	145	100	73.8	56.5	44.6	36.1	16.1	9.04
30	4080	4080	1020	453	255	163	113	83.3	63.8	50.4	40.8	18.1	10.2

Thermal Dose Exceeds
Capabilities of FRG

Thermal Dose within the
Capability Limit for FRG

Table AA 2.3: Fire Size Versus Separation Distance for 2.0 Second Exposure

Flame Volume, m ³	Emitted Radiant Flux, kW/m ²	Incident Radiant Intensity, kW/m ² , at Distance, m											
		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10	15	20
1.0	434	434	108	48.2	27.1	17.4	12.1	8.86	6.78	5.36	4.34	1.93	1.09
2.0	672	672	168	74.7	42.0	26.9	18.7	13.7	10.5	8.30	6.72	2.99	1.68
3.0	880	880	220	97.8	55.0	35.2	24.4	18.0	13.8	10.9	8.80	3.91	2.20
4.0	1066	1066	267	118	66.6	42.6	29.6	21.8	16.7	13.2	10.6	4.73	2.67
5.0	1237	1237	309	137	77.3	49.5	34.4	25.2	19.3	15.3	12.4	5.50	3.09
7.5	1621	1621	405	180	101	64.8	45.0	33.1	25.3	20.0	16.2	7.2	4.05
10	1963	1963	491	218	123	78.5	54.5	40.1	30.7	24.2	19.6	8.72	4.91
15	2572	2572	643	285	160	103	71.4	52.5	40.2	31.8	25.7	11.4	6.43
20	3115	3115	779	346	194	125	86.5	63.6	48.7	38.5	31.2	13.8	7.79
25	3614	3614	904	402	226	145	100	73.8	56.5	44.6	36.1	16.1	9.04
30	4080	4080	1020	453	255	163	113	83.3	63.8	50.4	40.8	18.1	10.2

Thermal Dose Exceeds
Capabilities of FRG

Thermal Dose within the
Capability Limit for FRG

Table AA 2.4: Fire Size Versus Separation Distance for 3.0 Second Exposure

Where the deflagration flame is expected to persist for no more than 1.0 second, such as in a flash fire incident at the fill port of a mixer, FRG designed in accordance with NFPA 2112 can be relied upon to achieve the prevention of occupant injury for fire size and separation distance conditions to the right and above the 1.0 Second Exposure Limit line on Table AA2.1. Note, at a 1.0 second exposure time, an occupant equipped with FRG located 1.0 m from a 1.0 m³ deflagration/flash-fire is expected to sustain burn injury. The separation distance must be increased to 2 m if injury is to be prevented. At a separation distance of 2.0 m the employee equipped with FRG could escape injury in the event of a fire up to 3.0 m³ in flame volume.

If the deflagration flame is expected to persist for longer than 1.0 seconds but not longer than 2.0 seconds, the protection provided by FRG predicted by Table AA 2.2 will not achieve the injury limitation objectives at the separation distance contemplated. The separation distance between the deflagration and the target occupant must be increased of Table AA2.3 should be used.

Where the deflagration flame is expected to persist for no more than 2.0 seconds, FRG designed in accordance with NFPA 2112 can be relied upon to achieve the prevention of occupant injury for fire size and separation distance conditions to the right and above the 2.0 Second Exposure Limit line in Table AA 2.3.

Where the deflagration flame is expected to persist for no more than 3.0 seconds, FRG designed in accordance with NFPA 2112 can be relied upon to achieve the prevention of

occupant injury for fire size and separation distance conditions to the right and above the 3.0 Second Exposure Limit line in Table AA 2,4.

AA 2.3 Thermal Dose Estimates for Deflagrations Involving Combustible Metal Particulates

The design of a personnel protection strategy for areas containing combustible metal particulates must address the much higher heats of combustion exhibited by the combustible metal particulates. The 350 kW/m² effective radiant flux criterion used for combustible liquids, gases and non-metallic particulates as experimentally derived from large-scale diffusion flames. The flame temperatures for diffusion flames involving hydrocarbon fuels are generally on the order of 1,400 to 1,600 °K (1,100 to 1,900 °C). ⁷ Combustible metal particulates burn at much higher temperatures. The flame temperatures for combustible metal particulates in air suspension are shown in Table AA 3.1, below. (The data for metal dust deflagration flame temperature was not directly measured but rather was computed from pressure data obtained using the U.S.B.O.M 20-liter hemispherical test apparatus. The data for heat of combustion was derived from oxygen consumption cone calorimetry))

Element	Flame Temperature, °K ⁸	Heat of Combustion MJ/kg ⁹
Aluminum	2800-4000	31.06
Boron	1700	58.83
Carbon	1700-2600	
Chromium	1850-3170	10.78
Hafnium	2400-4850	
Magnesium	2850-3600	24.73
Molybdenum	2600	
Nickel	2400	
Niobium	2100-3540	
Tantalum	2350-3750	
Tin	1550-2250	
Titanium	2850-3990	19.6
Tungsten	1550-3100	4.59
Zinc	1750-2070	5.37

Table AA.3.1 Flame Temperatures and Net Heat of Combustion for Combustible Metal Particulates.

Published data does not exist for the radiant flux from combustible metal deflagrations.

AA. 3.0

Where the deflagration flame is expected to be fueled and propagated by the suspension of accumulated fugitive dust already existing within the building compartment, neither the flame volume nor the separation distance can be reliably predicted. The source of the combustible dust suspension is the dust accumulation that exists in the building compartment interior and one cannot predict how much of that accumulated dust will become suspended either by some initiating event or by the pressure front resulting from the deflagration. Furthermore, the deflagration flame front is expected to be moving across the compartment interior. With changing distance comes changing radiant exposure. If the flame front propagates towards the occupant the radiant exposure rapidly increases and flame impingement upon the occupant is a distinct possibility. Once flame impingement occurs the heat transfer mechanism from the fire to the target (occupant) becomes dominated by convective and conductive heat transfer. The rate of heat flow into the target (occupant) is much greater than the 82 kW/m² used as the benchmark radiant flux in NFPA 2112. Under these conditions FRG cannot be relied upon to achieve a personnel injury limitation objective. Consequently, reliance on FRG is not an acceptable personnel protection strategy for building compartment deflagration (BCD) hazards.

Since FRG cannot be relied upon to limit personnel injury in a BCD scenario, other hazard management strategies must be employed. The first, and most obvious, is to change the conditions within the building compartment that make a BCD possible. This means to reduce the quantity of accumulated dust within the building compartment to a level that will not propagate a BCD.

Each of the commodity chapters, Chapters 11 through 15, have accumulated dust layer thickness criteria in the hazard assessment sections that are used to distinguish building compartments that are expected to pose a deflagration hazard from those that are not. The dust layer thickness criteria are derived from historical experience.

An alternative hazard management strategy is to preclude personnel from the dusty building compartments during those times during which ignition scenarios are credible. This usually includes during normal operation.

¹ Hurley, Morgan, P.E., FSFPE, Editor-in-Chief, ***The SFPE Handbook of Fire Protection Engineering***, 5th Edition, Springer Science+Business Media, New York, 2016, Chapters 66 & 67.

² Hurley, Morgan, P.E., FSFPE, Editor-in-Chief, ***The SFPE Handbook of Fire Protection Engineering***, 5th Edition, Springer Science+Business Media, New York, 2016, pg. 2654.

³ Section B.1, **NFPA 2112, *Standard on Flame Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposure from Fire***, 2018 Edition, National Fire Protection Association, Quincy, MA 02269

⁴ NFPA 2112, ***Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire***, 2018 Edition, National Fire Protection Association, Quincy, MA 02269.

⁵ NFPA 2113, ***Standard on the Selection, Care, Use, and Maintenance of Flame Resistant Garments for Protection of Industrial Personnel Against Flash Fire***, 2018 Edition, National Fire Protection Association, Quincy, MA 02269.

⁶ Hurley, Morgan, P.E., FSFPE, Editor-in-Chief, ***The SFPE Handbook of Fire Protection Engineering***, 5th Edition, Springer Science+Business Media, New York, 2016, pg. 2655.

⁷ Drysdale, Dougal, ***Introduction to Fire Dynamics***, 2nd Ed., John Wiley & Sons, New York, NY, 2011, pgs. 77, 129, 148-149

⁸ https://stacks.cdc.gov/cdc/cdc_8762_DS1

⁹ Hurley, Morgan, P.E., FSFPE, Editor-in-Chief, ***The SFPE Handbook of Fire Protection Engineering***, 5th Edition, Springer Science+Business Media, New York, 2016, Table A.33, pg. 3449



Public Comment No. 262-NFPA 660-2024 [Section No. A.8.8.3.1]

A.8.8.3.1

Safe work habits are developed and do not occur naturally. The training program should provide enough background information regarding the hazards of the materials and the process so that the employees can understand why it is important to follow the prescribed procedures. Training should address the following:

- (1) The hazards of their working environment and procedures in case of emergencies, including fires, flash fires (local/ building compartment) , and explosions (building/equipment) , and hazardous materials releases
- (2) Operating, inspection, testing, and maintenance procedures applicable to their assigned work
- (3) Normal process procedures as well as emergency procedures and changes to procedures
- (4) Emergency response plans, including safe and proper evacuation of their work area and the permissible methods for fighting incipient fires in their work area
- (5) The necessity for proper functioning of related fire and explosion protection systems
- (6) Safe handling, use, storage, and disposal of hazardous materials used in the employees' work areas
- (7) The location and operation of fire protection equipment, manual pull stations and alarms, emergency phones, first-aid supplies, and safety equipment
- (8) Equipment operation, safe start-up and shutdown, and response to upset conditions

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new A.8.8.3.1	

Submitter Information Verification

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 264-NFPA 660-2024 [Section No. A.8.9.3.4]

A.8.9.3.4

In addition to the combustible dust or particulate solid fire, flash fire (local/building compartment) , and explosion (building/equipment) hazards, contractors should also be made aware of other potential process and occupational hazards. There can be combustible materials other than combustible dusts in the equipment or immediate vicinity where contractors might be working. Combustion of dusts can generate toxic products, and some combustible dusts are acutely toxic.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the new proposed definitions in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• This is a modification to new A.8.9.3.4	

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Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.

**Public Comment No. 108-NFPA 660-2023 [Section No. A.9.3.5.3.6]****A.9.3.5.3.6**

The assertion of separation must recognize the dust accumulation on all surfaces in the intervening distance, including floors, beam flanges, piping, ductwork, equipment, suspended ceilings, light fixtures, and walls. Process equipment or ductwork containing dust can also provide a connecting conduit for propagation between accumulation areas. In order to prevent flame propagation across the separation distance, the dust accumulation should be very low. The National Grain and Feed Association study, *Dust Explosion Propagation in Simulated Grain Conveyor Galleries*, has shown that a layer as thin as 1/100 in. (0.025 cm) is sufficient to propagate flame in a limited expansion connection, such as an exhaust duct or a hallway. In the subject study, the flame propagated for at least 80 ft (24.4 m) in a gallery 8 ft (2.4 m) tall by 8 ft (2.4 m) wide.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._27.pdf	NFPA 660 CC Note No. 27	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 27 appeared in the First Draft Report in NFPA 660.

A.9.3.5.3.6 references National Grain and Feed Association study, *Dust Explosion Propagation in Simulated Grain Conveyor Galleries*. There are currently 2 entries in Annex Z. Should one of these be deleted?

Z.1.24: Tamanini, F., *Dust Explosion Propagation in Simulated Grain Conveyor Galleries*, ESV-83-067, National Grain and Feed Association Fire and Explosion Research Report, prepared by Factory Mutual Research Corporation, Norwood, MA, July 2002.

Z.1.2.14 National Grain and Feed Association Publications. *Dust Explosion Propagation in Simulated Grain Conveyor Galleries*, 1983 edition.

Related Item

- CC Note 27

Submitter Information Verification

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Submittal Date: Wed Dec 20 12:57:09 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-65-NFPA 660-2024](#)

Statement: The 1983 report is correctly cited in the National Grain and Feed Association Publications section. There was no republication in 2002.



Correlating Committee Note No. 27-NFPA 660-2023 [Section No. A.9.3.5.3.6]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Tue Aug 15 14:17:08 EDT 2023

Committee Statement

Committee Statement: A.9.3.5.3.6 references National Grain and Feed Association study, Dust Explosion Propagation in Simulated Grain Conveyor Galleries. There are currently 2 entries in Annex Z. Should one of these be deleted?

Z.1.24: Tamanini, F., Dust Explosion Propagation in Simulated Grain Conveyor Galleries, ESV-83-067, National Grain and Feed Association Fire and Explosion Research Report, prepared by Factory Mutual Research Corporation, Norwood, MA, July 2002.

Z.1.2.14 National Grain and Feed Association Publications. Dust Explosion Propagation in Simulated Grain Conveyor Galleries, 1983 edition.

Ballot Results

✓ **This item has passed ballot**

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.
Mattos, Jr., Arthur P.
Miller, Jeremy
Osborn, Jack E.
Pedersen, Niels H.
Roberts, Jeffrey R.
Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris
ok

**Public Comment No. 109-NFPA 660-2023 [Section No. A.9.6.12]****A.9.6.12**

Particular attention should be paid to the potential for a lightning strike on roof-mounted dust collectors, cyclones, and ductwork. The electromagnetic pulse from a lightning strike to these pieces of equipment can cause severe damage to any electronic equipment, including spark detection and extinguishing systems, installed on such equipment. The impulse current from a direct lightning strike on roof-mounted dust collectors, cyclones, and ductwork can ignite wood waste within this equipment that can subsequently be conveyed to other locations in the facility.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._107.pdf	NFPA 660 CC Note No. 107	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 107 appeared in the First Draft Report in NFPA 660.

Consider the following note from CMD-AGR: In A.9.6.12 for lightning protection, remove reference to "wood waste" and replace with "combustible material" to make this fundamental. Also reference general lightning protection of buildings, tanks, and silos along with the equipment already mentioned.

Related Item

- CC Note 107

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 20 13:01:04 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-66-NFPA 660-2024](#)

Statement: This revision replaces the reference to "wood waste" with "combustible material" to make this fundamental. Also references general lightning protection of buildings, tanks, and silos along with the equipment already mentioned.



Correlating Committee Note No. 107-NFPA 660-2023 [Section No. A.9.6.12]

Submitter Information Verification

Committee: CMD-AAC

Submittal Date: Fri Aug 18 16:34:59 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-AGR: In A.9.6.12 for lightning protection, remove reference to "wood waste" and replace with "combustible material" to make this fundamental. Also reference general lightning protection of buildings, tanks, and silos along with the equipment already mentioned.

Ballot Results

✔ This item has passed ballot

18 Eligible Voters

3 Not Returned

14 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Davis, Scott G.

Krbec, Jason

Kreitman, Kevin

Affirmative All

Bujewski, Matthew J.

Cholin, John M.

Creswell, Gregory F.

Edwards, Brian

Frank, Walter L.

Kimbell, Kevin

LaPine, Edward R.

LeBlanc, John A.

Mattos, Jr., Arthur P.

Miller, Jeremy

Osborn, Jack E.

Pedersen, Niels H.

Roberts, Jeffrey R.

Slaunwhite, Jeramy

Affirmative with Comment

Aiken, Chris

ok



Public Comment No. 110-NFPA 660-2023 [Section No. A.9.8.2.1]

A.9.8.2.1

A dust explosion hazard can exist in small containers; however, deflagration venting or suppression measures for these units are not always possible. Consideration should be given to explosion hazards when electing to omit protection; 8 ft³ (0.2 m³) is roughly the size of a 55 gal (208.2 L) drum. Explosion prevention using inerting or pressure containment can be an effective means of managing the hazard. See also A.4.2.1.1.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
660_CCN_No._97.pdf	NFPA 660 CC Note No. 97	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 97 appeared in the First Draft Report on First Revisions No. 165 in NFPA 660.

Consider the following note from CMD-HAP: Add language regarding FRG potentially being an appropriate safeguard for local operators to A.9.8.2.1- and avoiding non-flame retardant synthetic clothing.

Related Item

- FR No. 165

Submitter Information Verification

Submitter Full Name:

Organization: Notes

Street Address:

City:

State:

Zip:

Submittal Date: Wed Dec 20 13:03:54 EST 2023

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but see related SR

Resolution: [SR-67-NFPA 660-2024](#)

Statement: Changes were made to highlight the fact that FRG may provide protection from some of the hazards but not all.



Correlating Committee Note No. 97-NFPA 660-2023 [Section No. A.9.8.2.1]

Submitter Information Verification

Committee: CMD-FUN

Submittal Date: Fri Aug 18 13:52:37 EDT 2023

Committee Statement

Committee Statement: Consider the following note from CMD-HAP: Add language regarding FRG potentially being an appropriate safeguard for local operators to A.9.8.2.1- and avoiding non-flame retardant synthetic clothing.

First Revision No. 165-NFPA 660-2023 [Section No. A.9.8.2.1]

Ballot Results

This item has not been balloted



Public Comment No. 300-NFPA 660-2024 [Section No. A.9.8.2.1]

A.9.8.2.1

A dust ~~An equipment~~ explosion hazard can exist in small containers; however, ~~deflagration venting or suppression measures for~~ explosion protection (e.g., venting per NFPA 68 or suppression measures per NFPA 69) for these units are not always possible. Consideration should be given to explosion hazards when electing to omit protection; 8 ft³ (0.2 m³) is roughly the size of a 55 gal (208.2 L) drum. Explosion prevention using inerting or pressure containment can be an effective means of managing the hazard. See also A.4.2.1.1.

Statement of Problem and Substantiation for Public Comment

This modification is tied to the definitions proposed in 3.3.38

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 232-NFPA 660-2024 [New Section after 3.3]	
<u>Related Item</u>	
• modified new A.9.8.2.1	

Submitter Information Verification

Submitter Full Name: John LeBlanc
Organization: FM Global
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 16:16:16 EST 2024
Committee: CMD-FUN

Committee Statement

Committee Action: Rejected
Resolution: The terminology change proposed by PC 232 was Rejected but Held for the next revision cycle, so it is not appropriate to make these changes throughout the standard at this time.



Public Comment No. 285-NFPA 660-2024 [New Section after A.9.9.6.6]

Annex Material for Proposed Chapter 10

A.10.2.1

All plant personnel, including management, supervisors, and maintenance and operating personnel, should be trained to participate in plans for controlling plant emergencies.

The emergency plan should contain the following elements:

- (1) A signal or alarm system
- (2) Identification of means of egress
- (3) Minimization of effects on operating personnel and the community
- (4) Minimization of property and equipment losses
- (5) Interdepartmental and interplant cooperation
- (6) Cooperation of outside agencies
- (7) The release of accurate information to the public

Emergency drills should be performed annually by plant personnel. Malfunctions of the process should be simulated and emergency actions undertaken. Disaster drills that simulate a major catastrophic situation should be undertaken periodically with the cooperation and participation of public fire, police, and other local community emergency units and nearby cooperating plants. Specialized training for the public fire department(s) and industrial fire brigades can be warranted due to facility-specific hazards where the methods to control and extinguish a fire can be outside of their normal arena of traditional firefighting. (See OSHA's publication, *Firefighting Precautions at Facilities with Combustible Dust*, for additional information.)

A.10.3.10 See OSHA's publication, *Firefighting Precautions at Facilities with Combustible Dust*, for additional information.

A.10.4.1 This plan should meet the recommendations contained in the *National Grain and Feed Association Research Report, Emergency Preplanning and Fire Fighting Manual - A Guide for Grain Elevator Operators and Fire Department Officials* or other industry or commodity specific guide.

A.10.4.2.1

Burning combustible metals will burn through material used in the construction of most firefighter protective clothing. Some features (e.g., heavy quilted linings, aluminized outer shells) can reduce this risk. The self-contained breathing apparatus (SCBA) facepiece eye protection worn by firefighters adequately protects against the effects of a lithium fire, with the exception of the intense light given off by burning lithium. (See NFPA 1500.)

Specific testing indicates that white-light levels emitted from burning lithium exceed recommended levels, and extended lithium fire experience has shown that this intense light can cause serious damage to unprotected eyes. A clip-on adapter over an SCBA facepiece with a shaded glass lens equivalent to a No. 6 welding lens has been used successfully to reduce such hazards. A darker lens tends to obstruct the firefighter's view to an unacceptable degree.

A.10.4.3 Manual firefighting could pose an unacceptable risk to facility personnel and emergency responders.

A.10.4.5.4 A nozzle listed or approved for use on Class C fires produces a fog discharge pattern that is less likely than a straight stream nozzle to suspend combustible dust, which could otherwise produce a dust flash fire or explosion potential.

A.10.5.2.4 *Elevator Leg Fires.* Material flow into a leg should be stopped and the leg should be shut down. Leg fires should be extinguished by water fog or gentle application of water. Fires should be located by feeling the leg casing for heat or observing discoloration of metal. If the location is unknown, water should be applied first in the boot section, then in the bin-pulley access door, and last in the head section.

A.10.5.2.5 *Conveyor Belt Fires.* The conveyor belt should be shutdown (halted). Conveyor belt fires should be extinguished by application of water. Material flow to the conveyor belt should be stopped. If necessary, the belt should be cut to isolate the fire.

A.10.5.2.6 *Dryer Fires.* Dryer fires should be extinguished by removing burning material from the dryer or gentle application of water. Fuel to burners, fans, and material flow into the dryer and from the facility should be stopped. If necessary, emergency dump should be used to remove material from the dryer.

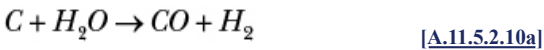
A.10.5.2.7 *Concrete Bin or Silo and Steel Tank Fires.* Concrete bin or silo fires should be extinguished by wetting the top surface of the material with gentle application of water at a low flow rate directly to the burning materials, and then removal of burning material from the bin or silo directly to the outside. Fire should be located by thermometer probes, thermographic photography, or feeling heat on bin or silo surfaces. Openings to the bin or silo should be sealed to limit oxygen entry. Material flow to and from the bin or silo should be stopped. Firefighting operations should be done from outside the bin or silo. Fires should be isolated by selective unloading of material onto the ground.

A.10.5.2.8 *Concrete Bin or Silo and Steel Tank Smolders.* A deep-seated smolder in a bin, tank, or silo should not be extinguished with water. The addition of water can generate CO that would build up in the bin and potentially explode [see list item (7)]. A better approach

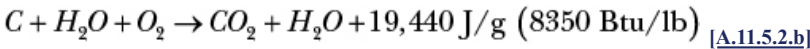
is to inject inert gas (such as carbon dioxide or nitrogen) to displace the oxygen and smother the smolder.

A.10.5.2.9 *Fumigant or Chemical Fires.* Fires involving fumigants containing phosphine should be extinguished by inert material or nonaqueous agent used for Class B fires. Water should not be used for phosphine fires to avoid exothermic reaction and development of explosive gases.

A.10.5.2.10 *Water Gas Reaction.* Application of small amounts of water on glowing grain in a partially confined space, such as a grain silo, and in the presence of air can generate a water gas reaction. The glowing grain must be at a temperature of at least 1290°F to 1470°F (700°C to 800°C), and initial water contact might not cool the mass of glowing grain below 1110°F (600°C). The partial oxidation reduction between carbon and water forms carbon monoxide and hydrogen as shown in Equation A.11.5.2.10.



In the presence of oxygen (air), the carbon monoxide and hydrogen burn, immediately releasing heat as shown in Equation A.11.8.10.3b.



In a partially confined space, the combustion energy will rapidly pressurize the space beyond what the silo walls or tops can withstand, causing destruction of the silo.

A.10.7 The objectives in fighting combustible metal fires are isolation and containment, rather than extinguishment. Water and other liquids have proved ineffective in extinguishing combustible metal fires. Streams of water intensify most combustible metal fires by feeding it oxygen. There is also the possibility of causing a steam or hydrogen explosion, particularly if large amounts of combustible metal are involved. The great affinity of high-temperature combustible metal for oxygen frees a considerable amount of hydrogen, which can reach explosive concentrations in confined spaces. Entrapment of water under any burning or hot combustible metal can result in a steam explosion.

Because of their unique nature, combustible metal fires demand a comprehensive fire protection plan wherever combustible metal is processed, handled, used, or stored. This plan should include specific actions in the event of a combustible metal fire and should be coordinated with the local facility management, responding firefighters, and medical personnel.

The plan should recognize the extreme hazards associated with combustible metal–water reactions that might occur with sprinkler water. Specific attention should be given to an evacuation plan for personnel in the event of any release of water.

Properly trained personnel who work with combustible metal know its hazards. Such personnel are best equipped to extinguish a combustible metal fire in its incipient stage. Training should include sufficient information to determine whether extinguishment can be accomplished safely and effectively.

A.10.7.3.1 One of the greatest dangers to firefighters is the splattering effect of burning alkali metals. Molten alkali metal is very fluid and easily spread; therefore, extreme care needs to be taken when applying firefighting agent. The force used to deliver agent from an extinguisher can cause the molten alkali to splash to adjacent areas. Therefore, the delivery technique is very important. If direct agent application becomes hazardous, indirect application techniques should be used. Deflecting agent off another object or directing the agent stream above the hazard and letting the agent fall by gravity can be effective.

A.10.7.3.2 Forming a crust over burning alkali metals reduces the available oxygen and eliminates exothermic reactions. Extinguishing agent should first be applied to the white-hot burning areas, then evenly applied to the mass, controlling the flow to form an oxygen-depleting crust. Since alkali metal tends to flow easily through any weak spots, agents should be applied evenly to construct a continuous crust. If the alkali metal surfaces, additional agent should be applied to strengthen the crust.

Actual crust formation is created by the ability of some powdered agents to absorb heat from the alkali metals. In the case of copper powder, an alkali metal–copper alloy is formed as heat is absorbed from an alkali metal. Once the crust is formed, the temperature of the alkali metal decreases and exothermic reactions are reduced. Extreme care should be taken to ensure that the crust is not disturbed or broken until the temperature of the alkali metal is decreased to the point where resolidification occurs (or in the case of NaK, until the mass is at or near room temperature).

A.10.7.4.6 It is recommended that a practice fire drill be conducted once each year to familiarize local fire department personnel with the proper methods of fighting Class D fires. Professional or volunteer firefighters from outside the plant cannot be expected to be trained for the specific fire and life hazards associated with metal powder and fires. In the interest of their own safety, they should be directed by the plant’s safety officer or firefighting officer.

Statement of Problem and Substantiation for Public Comment

The correlating committee formed a task group to combine firefighting and emergency planning requirements and guidelines into a new Chapter 10. This is annex material developed by that task group.

Related Public Comments for This Document

Related Comment	Relationship
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[Public Comment No. 225-NFPA 660-2024 \[Chapter 10\]](#)

Related Item

- Correlating Note/Task Group •

Submitter Information Verification

Submitter Full Name: Timothy Myers

Organization: Exponent, Inc.

Street Address:

City:

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Zip:

Submittal Date: Thu Jan 04 15:55:39 EST 2024

Committee: CMD-FUN

Committee Statement

Committee Action: Rejected but held

Resolution: Although the committee agrees that this material should be consolidated into Chapter 10, this is too substantial to change at the Second Draft stage and is being held for the next edition.