

**DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD**

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NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 9-84

Subj: Electrical Installations in Agricultural Dust Locations

Ref: (a) "National Electrical Code," NFPA 70 - 1984
(b) "Classification of Dusts Relative to Electrical Equipment in Class II Hazardous Locations," National Materials Advisory Board Report, NMAB 353-4 of July 1982
(c) "Area Classification in Hazardous Dusts Locations," Instrument Society of America Standard 12.10
(d) "Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous Locations," NEPA 497M - 1983

1. PURPOSE. The purpose of this Circular is to provide guidance for classifying hazardous locations caused by agricultural dusts and also to provide guidance for the design, installation, and inspection of electrical equipment and systems in such locations.
2. BACKGROUND. There has been an increase in requests for the endorsement of Certificates of Inspection (COIs) for the carriage of agricultural products. Many of these requests concern vessels whose COI's are already endorsed to carry coal or a specific grain and usually inquire about the requirements for endorsement of the COI to allow the carriage or addition of agricultural products.
3. DISCUSSION. Enclosure (1) is a guide for safe electrical installations on vessels carrying agricultural products. It is intended to provide uniform guidelines for the endorsement of the vessel's COI for carrying agricultural products.
4. ACTION. Coast Guard marine inspection personnel, shipbuilders, designers, and operators are encouraged to use the recommended design, installation, and inspection guidelines in enclosure (1) when considering the carriage of agricultural products. Additional information on this topic is available in References (a), (b), (c), and (d).


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End: (1) Guide for Electrical Installations in Agricultural Dust Locations

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Electrical Installations in Agricultural Dust Locations

1. INTRODUCTION:

- A. The purpose of this guide is to clarify the Electrical Engineering Regulations, Subchapter J, for the installation of electrical equipment in locations that may be hazardous due to the presence of agricultural dusts.
- B. Dusts have been defined to be particles smaller than 74 microns in diameter (through 200 mesh USS) and dust can be seen.
- C. Too often in the handling of agricultural products the explosive hazard is unrecognized or ignored because these products appear relatively harmless in bulk form. However, agricultural products may become extremely hazardous in a dust form and have resulted in damaging explosions.
- D. The initial cause of a dust explosion may be a small spark or flame. The initial explosion will often dislodge additional dust from the surroundings which then may be ignited by the residual energy and cause a second and possibly more damaging explosion. Dust which has accumulated in layers will not explode, but will melt, char, or burn. This burning generates heat which may ignite dispersed dust and explode. It is vitally important to keep dust accumulations to a minimum.
- E. Hazards due to agricultural dusts are not specifically addressed in 46 CFR Parts 110-113, the Electrical Engineering Regulations. However, 46 CFR 111.105 does give the requirements for electrical installations in Class II locations and gives specific requirements for vessels carrying coal. This guide further defines the practices that are necessary for the classification of hazardous areas due to agricultural dusts.

2. AREA CLASSIFICATION:

- A. Class II locations are those locations that are hazardous due to the presence of combustible dusts. These locations are sub-divided into Division 1 and Division 2 locations.
- B. Class II, Division 1 locations are those:
 - 1. that contain low resistivity powders;
 - 2. that periodically contain a combustible cloud concentration;
 - 3. where a process or equipment malfunction could release a combustible dust cloud and cause an electrical failure that would produce a source of ignition; or
 - 4. where large dust accumulations exist for extended periods of time.
- C. Class II, Division 2 locations are those:
 - 1. in which dust may accumulate in layers greater than the hazardous layer thickness but are not sufficient to justify a Division 1 location; or

2. that infrequently (not more than once a year) produce a combustible cloud concentration.
- D. All agricultural dusts have a high resistivity, therefore a Division 1 classification is based on 2.b., 2.c. and 2.d. A primary concern is with open machinery where dust occurs when the product experiences a change in speed or direction. Examples are:
 - At discharges
 - On belt conveyers
 - At transfer points between belt conveyers
 - Dumps
 - Inside of holds, bins, or bags being filled
 - Discharge spouts or scoops

NOTE: It is unlikely that a Division 1 location exists where a person can remain without breathing apparatus.
- E. Defining a Division 2 location is not as easy. A Division 2 location usually surrounds a Division 1 location. The size of the Division 2 area is dependent on many factors which include: cleaning frequency, height at which the dust is released, speed and direction of the release, air currents, type of product, and the location of restrictive barriers.

3. MATERIAL CLASSIFICATION

- A. Class II materials are divided into two groups, Group E and Group G, with each group representing materials of a similar hazard.
- B. Group E contains combustible metal dusts or other combustible dusts of similarly hazardous characteristics having resistivity of less than 100,000 ohm/centimeter.
- C. Group G contains combustible dusts having resistivity of 100,000 ohm/centimeter or greater. All agricultural dusts are in Group G.
- D. Equipment in hazardous locations must be approved for the Class and Division, as well as for the specific group of dust that will be present.

4. RECOMMENDATIONS

- A. The classification of hazardous areas may vary from location to location and should be based on the above guidelines and paragraphs C.4 and C.5.
- B. Electrical equipment should be located outside the hazardous area if possible.
- C. Any vessel that meets the requirements of 46 CFR 111.105-35 for carrying coal may carry in bulk any of the agricultural products listed in Table 1 of this enclosure without modification.
- D. The following areas should be Class II, Division 1 on vessels carrying in bulk any of the agricultural products listed in Table 1:

1. The interior of each cargo hold or bin.
 2. Areas where cargo is transferred, dropped, or dumped and locations within 1 meter of the outer edge of these areas in all directions.
- E. The following areas should be Class II, Division 2 locations on vessels carrying in bulk agricultural products listed in Table 1:
1. All areas within 2 meters of a Division 1 location in all directions except when there is an intervening barrier such as a bulkhead or deck.
- F. All electrical equipment and installations should be in accordance with the requirements of 46 CFR 111.105.
- G. Agricultural products which are not listed in Table 1 may be carried under these provisions, provided it can be shown they are not more hazardous than those which are listed.
- H. The importance of good housekeeping and locating electrical equipment outside of the hazardous areas can not be over-emphasized.

AGRICULTURAL DUSTS:

The following is a list of agricultural products that were classified as Group G by the National Materials Advisory Board:

Alfalfa meal	Malt barley
Almond shell	Milk, skimmed
Apricot pit	Moss, Irish
Cellulose	Onion, dehydrated
Cellulose, alpha	Pea flour
Cellulose, flock, fine cut	Peach-pit shell
Cherry pit	Peanut hull
Cinnamon	Peat, sphagnum sun-dried
Citrus peel	Pecan-nut shell
Cereal grass	Pectin
Cocoa bean shell	Potato starch, dextrinated
Cocoa natural, 19% fat	Pyrethrum, ground flower leaves
Coconut shell	Rauwolfia vomitoria root
Coffee, raw bean	Rice
Coffee, fully roasted	Rice bran
Coffee, instant spray-dried	Rice hull
Corn	Safflower meal
Corn cob grit	Soy flour
Corn dextrins, pure	Soy protein
Cornstarch, commercial product	Sucrose, chemically pure
Cornstarch (through #325 sieve)	Sucrose
Cork dust	Sugar, powdered
Cotton linter, raw	Tea, instant, spray-dried
Cottonseed meal	Tobacco stem
Cube root, South American	Tung kernels, oil-free
Egg white	Walnut shell, black
Flax shive	Wheat, untreated
Garlic, dehydrated	Wheat flour
Grain dust, winter wheat, corn, oats	Wheat gluten, gum
Grass seed, blue	Wheat starch, edible
Guar seed	Wheat starch, allyl chloride treated
Gum, arabic	Wheat straw
Gum, karaya	Wood, birch bark, ground
Gum, Manila (copal)	Wood flour, white pine
Gum, tragacanth	Yeast, torula
Hemp hurd	
Lycopodium	

Note: This list is based on the National Materials Advisory Board report NMAA 353-4 dated July 1982