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Tractors and Self-Propelled Machinery for Agriculture — Air Quality Systems for Cabs — Part 1: Terminology and Overview

Proposed by the ASABE Environment within Ag Vehicle Enclosures subcommittee; approved by the Power and Machinery Division and as an American National Standard February 2009; reaffirmed January 2014, December 2018; revised May 2023.

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1 Scope

This standard is intended for application to agricultural self-propelled machinery including tractors as defined by ASABE Standard ANSI/ASAE S390. It covers terminology, definitions and an overview of how cabs may be used in contaminated environments as part of an Occupational Health and Safety Management System.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/ASAE S390, Tractors and machinery for agriculture and forestry — Basic types — Vocabulary

ISO 5353:1995, Earth moving machinery, and tractors and machinery for agriculture and forestry — Seat index point

ASABE/ISO 14269-1:1997, Tractors and self-propelled machines for agriculture and forestry — Operator enclosure environment — Part 1: Vocabulary

ASABE/ISO 14269-5:1997, Tractors and self-propelled machinery for agriculture and forestry — Cab environment — Part 5: Pressurization system test method

ANSI/AIHA Z10, American Industrial Hygiene Association — Occupational Health and Safety Management Systems

3 Terms and Definitions

For the purpose of this standard these definitions apply:

3.1 aerodynamic diameter: diameter of a unit density sphere (i.e., density = 1.00 g/cm³) that would have the same settling velocity as the particle or aerosol in question

3.2 aerosol: suspension of solid, liquid or solid and liquid particles in a gaseous medium having a negligible falling velocity (generally considered to be less than 0,25 m/s)

[SOURCE: EN 132:1998, 3.1]

3.3 air exchange rate: number of times per unit of time the air in the cab is replaced

3.4 air filtration: removal of contaminants from the air, forced or drawn into the operator enclosure by mechanical means

3.5 air flow rate: volumetric unit of air transfer expressed in volume per relevant unit of time (m³/h)

3.6 air intake: designated area or opening through which air enters the cab

3.7 air purifying device: assembly that lowers the contaminant concentration in the air. Note, it can be a filter, sorbent, catalyst, a combination of these, or alternate technology capable of meeting the performance criteria

3.8 air purifying efficiency: ability of the air purifying system and/or device to remove contaminant matter

3.9 ambient conditions: environmental conditions surrounding the work vehicle

3.10 breathing zone: zone surrounding the operator's face. Its center is located 660 mm above the seat index point (SIP)

3.11 cab (operator enclosure): The part of the machine or tractor which forms a physical boundary between the space surrounding the operator and the outside environment. This boundary may comprise components such as the glass, roof and floor that completely surround the operator.

3.12 cab pressure: pressure differential between the static pressure inside and outside the cab (ISO 14269-5), (Pa)

3.13 cab volume: interior free space volume of the cab without the operator present, (m³)

3.14 cabin filter: subset of the air purifying device using a media to reduce the concentration of contaminants in the air passing through it

NOTE: In this standard series (S613) the term filter is used synonymously with the term 'air purifying device'.

3.15 cabin filter capacity: amount of dust and/or vapor that a filter is capable of removing from the influent air stream given a specific test condition

3.16 catalyst: substance that increases the rate of reaction but does not become part of the reaction product

3.17 challenge concentration: unit of test agent per unit of volume used to test the system/air purifying device

3.18 contaminant: any unwanted material

3.19 dermal exposure: exposure to a contaminant by skin contact

3.20 droplet: small, generally spherical shaped body of predominantly liquid material

3.21 dust: any particulate material, capable of being suspended in air, formed from a finely divided solid

3.22 efficiency: ratio of contaminant removed by the air purifying system/device to the initial contaminant present in the air stream

3.23 engineering control: An engineering designed measure used to reduce risk where it cannot be eliminated. See Annex A for the order of preference.

3.24 exposure assessment: An estimate of the future, upper limit on the operator exposure to an air contaminant. This estimate is based on: the upper 95% tolerance limit computed from past data, published exposure data, or mathematical models. Practically future exposures will be less than this value. Quantitative exposure measurements are the preferred means of assessing worker exposure per ANSI/AIHA Z10 and 29CFR1910.134.

3.25 floor mats: coverings placed over the floor of the cab

3.26 fumigant: pesticide that vaporizes readily at atmospheric air temperatures and pressures

3.27 gas: A state of matter in which the molecules are practically unrestricted by cohesive forces. A gas has neither shape nor volume.

3.28 hazard assessment: review of the estimated worker exposures and the hazards posed by the contaminants to determine whether the engineering controls or PPE, a combination of control measures and the organization's occupational health and safety program prevents adverse health outcomes attributed to the contaminants

3.29 hazard ratio: hazard ratio is the upper limit on the workers exposure divided by the occupational exposure limit

3.30 HVAC system: Heating, Ventilation, and Air-conditioning System. Functional grouping of mechanical air conditioning and air delivery components.

3.31 inhalation exposure: exposure to contaminants through the normal breathing process

3.32 intake air: outside or ambient air brought into the cab through the HVAC system

3.33 intake air filter: filter in the intake airflow system which is designed to reduce the concentration of contaminant from that in the ambient air level to a lower level for the operator breathing zone

3.34 intake airflow: volume of air per unit of time entering the cab from the outside (m^3/h) as specified by the manufacturer

3.35 interior materials: those materials used in constructing, forming or covering various interior surfaces of the cab

3.36 internally generated contaminant: any contaminant which is introduced into the air stream by the internal cab components off gassing of all internal cab components

3.37 leakage: condition in which air passes through or around a boundary in an unintended manner

3.38 occupational exposure limit (OEL): An occupational exposure limit (OEL) is the exposure at which practically all workers will experience no adverse health outcomes due to exposure to an air contaminant. These exposures are recommended by private non-governmental organizations, non-regulatory agencies and regulatory agencies. Exposure limits enforced by regulatory agencies may consider both technical feasibility and health effects. Exposure limits developed by other organizations may only consider health effect. The manager of the occupational safety and health program should review the basis for the OEL, review the current literature, and make knowledgeable decisions. Some organizations will specify internal exposure limits that are less than published occupational exposure limits.

3.39 operator enclosure (cab): see "cab"

3.40 operator introduced contaminant: contaminant that is introduced and/or generated into the cab by the operator, i.e., is carried on his hands, or on the footwear or clothing that is either worn or carried into the cab

3.41 oral exposure: exposure to contaminants by ingestion

3.42 particulate filter: device that lowers the total particulate concentration in the air stream