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CSA Z316.5:20
National Standard of Canada

Fume hoods and associated exhaust systems

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CSA Z316.5:20
May 2020

Title: *Fume hoods and associated exhaust systems*

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Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users to judge its suitability for their particular purpose.

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Published in May 2020 by CSA Group
A not-for-profit private sector organization
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

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ICS 91.140.30
ISBN 978-1-4883-2977-7

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Preface

This is the fourth edition of CSA Z316.5, *Fume hoods and associated exhaust systems*. It supersedes the previous editions published in 2015, 2004, and 1994.

The major changes to this edition include the following:

- the addition of ductless fume hoods to the scope;
- new requirements for selection criteria and risk assessment of fume hood types;
- new requirements for ductless fume hoods;
- new guidance on exhaust snorkels and canopy hoods; and
- expanded requirements for training and safe operating practices for fume hood users and maintenance staff.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of the governments of Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Northwest Territories, Nova Scotia, Nunavut, Ontario, Prince Edward Island, Quebec, Saskatchewan, and Yukon, as administered by the Canadian Agency for Drugs and Technologies in Health (CADTH).

This Standard was prepared by the Subcommittee on Fume Hoods, under the jurisdiction of the Technical Committee on Medical Laboratory Quality Systems and the Strategic Steering Committee on Health and Well-being, and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
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   a) *Standard designation (number);*
   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

CSA Z316.5:20
Fume hoods and associated exhaust systems

0 Introduction

This Standard is intended to assist designers, maintenance personnel, and end-users in ensuring that a fume hood will provide the necessary containment. This Standard is a key resource for professionals because it sets out minimum requirements and best practices for organizations and individuals involved in all aspects of fume hood design, maintenance, and use.

A fume hood is a mechanically ventilated, partially enclosed workstation where harmful materials can be handled safely. The primary function of a fume hood is to capture, contain, and remove gases, vapours, and aerosols generated within the fume hood enclosure, thereby protecting the user. At the correct height, the sash also provides a physical barrier, an important component of user protection. Fume hoods are used in manufacturing, research, medical, and university workplaces.

Most fume hoods use exhaust ducts, which are often referred to as ducted fume hoods. In a ducted fume hood, ducts and a fan ensure that the fume hood will capture heat and airborne contaminants, transport them out of the work area, and eventually discharge them into the atmosphere outside the building where the fume hood is located. Dilution provides protection for those outside the building. A ducted fume hood is usually constructed of non-combustible materials. Airflow into the fume hood is achieved by an exhaust fan that draws air from the workspace into the duct system. Contaminated air is then conveyed through the duct system and discharged into the atmosphere outside the building. In some cases, a pollution control device is part of the system.

Some fume hoods use filters instead of discharging the contaminants into the atmosphere. These are often referred to as ductless fume hoods. The return or recirculation of the air back into the room is the distinguishing feature between a ductless fume hood and traditional ducted fume hood. Air passing through a ducted fume hood is never recirculated, but rather it is exhausted outside the building. The recirculation of air from a ductless fume hood is also the feature that causes the greatest concern regarding the safe use of the hood. To remove gases and vapours, the filter media (activated charcoal is a common choice) must be specifically matched to the molecules in the gas or vapour being used. The appropriate matching is an absolute requirement for proper adsorption and, consequently, the safe use of the hood. Concerns also arise regarding the point at which the adsorbent filter becomes saturated and can no longer remove any more gases or vapours. Appropriate monitoring for the presence of gases and vapours and the installation of a backup filter are mechanisms that mitigate this concern.

Ductless fume hoods have specific uses in the laboratory because of the wide variety of chemicals used. Inappropriate materials or compounds or other misuse of the recirculating fume hood can result in contaminated air being recirculated into the work environment. Given the wide variety of chemicals that can be used in a laboratory, it is reasonable to expect that there might not be an appropriate adsorbent filter for all applications. Therefore, ductless fume hoods must be considered as having limited use in many circumstances and they also have the potential for inappropriate use, which could result in contaminated air being recirculated into the work environment.

Potential applications of ductless fume hoods need to be reviewed for acceptability prior to installation and use. Unless otherwise stated in the Standard, all other criteria (e.g., materials of construction, performance, etc.) are the same as with ducted hoods. Some jurisdictions prohibit use of ductless fume hoods with certain chemicals.

Some fume hoods are designed to protect workers from specific reagents or chemicals such as perchloric acid or nuclear substances. For these fume hoods, additional requirements are necessary.

This Standard was developed using CSA Group's Standards development process, which relies on the expert judgment and consensus of a Technical Committee of engineers, manufacturers, occupational health professionals, fume hood testing specialists, lab design architects, and governmental representatives, as well as extensive consultation with the user community.

1 Scope

1.1

This Standard applies to all types of laboratory fume hoods, including ductless fume hoods.

The following clauses are not relevant to ductless fume hoods: 4.3.6, 4.3.7, 4.3.8, 4.4, 5.3.5.1, 7.2, and 10.3.2.4 l) to p).

Note: *Ductless fume hoods should not be considered acceptable substitutes for ducted fume hoods. They may be suitable alternatives provided there is an application-specific review (i.e., risk assessment) and written approval by the manufacturer. Some jurisdictions prohibit the use of ductless fume hoods with certain chemicals.*

1.2

This Standard specifies

a) safety requirements for fume hoods, their users, and service personnel;
b) requirements for fume hood and exhaust system design and construction;
c) requirements for fume hood placement;
d) test methods for assessing fume hood performance;
e) requirements for the selection, use, and maintenance of fume hoods;
f) requirements for the education and training of fume hood users and maintenance personnel;
g) requirements regarding information to be exchanged between suppliers and users of fume hoods to ensure that installation, function, and maintenance are compatible with the intended use; and
h) requirements for commissioning.

Notes:

1) *Users of this Standard should note that fume hood requirements are also established by authorities having jurisdiction.*
2) *Other fume hood requirements can be found in, e.g., the* National Building Code of Canada*, the* National Fire Code of Canada*, the* Canadian Environmental Protection Act*, and the* Nuclear Safety and Control Act*.*

1.3

This Standard does not address detailed design considerations, such as hood design, fan selection, and duct/stack velocities.

This Standard does not apply to biological safety cabinets.

Notes:

1) *Requirements applicable to the installation and field testing of biological safety cabinets are found in NSF/ANSI 49.*

