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# Health and safety in welding and allied processes — Equipment for capture and separation of welding fume —

## Part 4: General requirements

*Hygiène et sécurité en soudage et techniques connexes — Équipements de captage et de filtration des fumées de soudage —*

*Partie 4: Exigences générales*

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# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 9, *Health and safety*.

ISO 15012 consists of the following parts, under the general title *Health and safety in welding and allied processes — Equipment for capture and separation of welding fume*:

— *Part 1: Requirements for testing and marking of separation efficiency*

— *Part 2: Determination of the minimum air volume flow rate of captor hoods and nozzles*

— *Part 3: Determination of the capture efficiency of on-gun welding fume extraction devices*

— *Part 4: General requirements*

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 9 via your national standards body. A complete listing of these bodies can be found at www.iso.org.


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# Introduction

Welding and allied processes generate fumes and gases which, if inhaled, can be harmful to human health. Therefore, control of the fumes and gases generated is to be exercised to minimize worker exposure.

The most effective method of control is to capture the fumes and gases close to their source before they enter a worker's breathing zone or the general workplace environment.

Ventilation equipment used to capture the fumes and gases is to be fit for purpose because inefficient capture could result in high exposure and can be detrimental to workers' health. It is important therefore that it adheres to defined manufacturing, materials and design requirements and gives warning of malfunction.

This part of ISO 15012 defines the general requirements that are necessary for ventilation equipment to maintain exposure to fumes at acceptable levels.

This part of ISO 15012 is a type-B standard as stated in ISO 12100.

This part of ISO 15012 is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of this part of ISO 15012 by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this part of ISO 15012.

In addition, this part of ISO 15012 is intended for standardization bodies elaborating type-C standards.

The requirements of this part of ISO 15012 can be supplemented or modified by a type-C standard.

For machines which are covered by the scope of a type-C standard and which have been designed and built according to the requirements of that standard, the requirements of that type-C standard take precedence.

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# Health and safety in welding and allied processes — Equipment for capture and separation of welding fume —

# Part 4: General requirements

## 1 Scope

This part of ISO 15012 defines the general requirements for ventilation equipment used to control exposure to fumes generated by welding and allied processes. It applies to the design and manufacture of all parts of the equipment including hoods, ducting, filter units, air movers, systems that inform of unsafe operation and workplace practices to ensure safe working with regard to exposure.

Significant hazards are listed in Clause 4. It does not cover electrical, mechanical and pneumatic hazards.

This part of ISO 15012 is applicable to the following:

— local exhaust ventilation systems (LEV);

— mobile and stationary equipment.

This part of ISO 15012 is not applicable to the following:

— general ventilation, air make up or air movement systems;

— air conditioning systems;

— separation of gases generated by or used by welding and allied processes;

— LEV used for welding and allied processes that generate reactive potentially explosive particles and atmospheres;

— grinding dust.

This part of ISO 15012 applies to systems designed and manufactured after its publication.

## 2 Normative references

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

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 15012-1:2013, *Health and safety in welding and allied processes — Equipment for capture and separation of welding fume — Part 1: Requirements for testing and marking of separation efficiency*

ISO 15012-2, *Health and safety in welding and allied processes — Requirements, testing and marking of equipment for air filtration — Part 2: Determination of the minimum air volume flow rate of captor hoods and nozzles*

ISO 15012-3, *Health and safety in welding and allied processes — Requirements, testing and marking of equipment for air filtration — Part 3: Determination of the capture efficiency of on-gun welding fume extraction*

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IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60335-2-69, *Household and similar electrical appliances — Safety — Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use*

IEC 60695-2-12, *Fire hazard testing — Part 2-12: Glowing/hot-wire based test methods — Glow-wire flammability index (GWFI) test method for materials*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and the following apply.

**3.1**
**welding fume separation equipment**
air filtration equipment, the purpose of which is to separate particles generated by welding and allied processes from workplace air

**3.2**
**filter cleaning system**
system designed to clean the filter of welding fume separation equipment in order to restore the air flow rate through the filter when it is reduced by an accumulation of welding fume particles

**3.3**
**on-line filter cleaning system**
filter cleaning system operating while welding fume separation equipment is working

**3.4**
**off-line filter cleaning system**
filter cleaning system operating after the air mover of the filtration equipment is switched off

**3.5**
**separation efficiency by mass**
ratio of the mass of particles retained by welding fume separation equipment to the mass of particles entering the equipment during a given period

Note 1 to entry: General information on test methods for determination of separation efficiency is described in EN 1093-6 and EN 1093-7.

**3.6**
**emission rate**
mass of the particles emitted by the welding fume source per time

Note 1 to entry: Emission rate is expressed in milligrams per second.

**3.7**
**local exhaust ventilation**
**LEV**
use of extraction to remove contaminated air at or near to its source

**3.8**
**spark arrestor**
device, normally positioned at the intake of welding fume separation equipment, used to prevent the damaging impact of sparks and large particles on filter media

Note 1 to entry: Examples of spark arrestors are cyclones, spin separators, baffles or sieves. A spark arrestor may be designed to also protect against flame damage.


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### 3.9 Extraction device

**3.9.1**
**captor hood**
equipment (movable or fixed) that generates sufficient air velocity at the source to capture and draw in the contaminated air

**3.9.2**
**receiving hood**
passive equipment (movable or fixed), normally positioned above a hot process, where the contaminated air is propelled into it by process-induced air movement

**3.9.3**
**enclosure**
**chamber**
fully or partially enclosed space where the process takes place, designed to contain and prevent the escape of hazardous substances into the workshop air

**3.10**
**welding fume**
airborne particles generated during welding

## 4 Significant hazards

Exposure to fumes and gases generated by welding and allied processes can be detrimental to health. Control of exposure can usually be achieved using ventilation equipment but any failure of this equipment, such as poor design and the use of parts made of unsuitable materials, can result in reduced extraction efficiency and hence over exposure and ill health.

Common health effects include respiratory disease, but exposure to carcinogenic substances during the welding of alloyed materials can occur and shall be considered.

The requirements of the ventilation equipment are dependent on the level of control necessary.

## 5 Requirements and verifications

### 5.1 General

Machinery shall comply with the safety requirements and/or protective/risk reduction measures in Clause 5. In addition, the machine shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this part of ISO 15012.

### 5.2 Welding fume separation equipment

All parts and materials used in the manufacture of welding fume ventilation equipment shall withstand the conditions (thermal, mechanical, UV radiation) present in the environment in which they are intended to be used.

Verification shall be performed by examining the manufacturer's datasheets, the instruction manual, and by referring to the manufacturer's long-term experience with respective devices.

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