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Additive manufacturing of metals — Environment, health and safety — General principles for use of metallic materials

Fabrication additive de métaux — Environnement, santé et sécurité — Principes généraux pour l'utilisation de matériaux métalliques

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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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 261, *Additive manufacturing*, in cooperation with ASTM Committee F42, *Additive manufacturing technologies*, on the basis of a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on additive manufacturing, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 438, *Additive manufacturing,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The use of additive manufacturing (AM) processes with metallic feedstock entails a number of hazards. It is therefore important, as a first step, to implement a high level of protection during manufacturing and installation of the additive manufacturing machine or system. For this purpose, ISO/ASTM 52938-1 dealing with safety of PBF-LB machines is under preparation.

In addition, the users of additive manufacturing plants have the duty to reduce the risks for the operators remaining after installation so that they fulfil the nationally or regionally pertinent regulations for health and safety at work. The latter are very different worldwide and the requirements of a standard cannot fully reflect them. For users of additive manufacturing plants, the guidelines and requirements of this document are, therefore, particularly relevant with regard to aspects not sufficiently covered by pertinent national or regional regulations for safety and health at work.

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Additive manufacturing of metals — Environment, health and safety — General principles for use of metallic materials

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1 Scope

This document provides guidance and requirements for risk assessment and implementation of prevention and protection measures relating to additive manufacturing with metallic powders.

The risks covered by this document concern all sub-processes composing the manufacturing process, including the management of waste.

This document does not specify requirements for the design of machinery and equipment used for additive manufacturing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 11611, *Protective clothing for use in welding and allied processes*

ISO 16321-1, *Eye and face protection for occupational use — Part 1: General requirements*

ISO 16321-3, *Eye and face protection for occupational use — Part 3: Additional requirements for mesh protectors*

ISO/ASTM 52900, *Additive manufacturing — General principles — Fundamentals and vocabulary*

ISO/ASTM 52907:2019, *Additive manufacturing — Feedstock materials — Methods to characterize metal powders*

IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

IEC 60079-10-2, *Explosive atmospheres — Part 10-2: classification of areas — Combustible dust atmospheres*

ANSI Z87.1, *Practice for Occupational and Educational Eye and Face Protection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/ASTM 52900 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Abbreviations

The abbreviations and acronyms used in this document are listed in Table 1.

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