



BSI Standards Publication

Additive manufacturing of polymers — Feedstock materials — Qualification of materials for laser-based powder bed fusion of parts

National foreword

This British Standard is the UK implementation of EN ISO/ASTM 52925:2022. It is identical to ISO/ASTM 52925:2022.

The UK participation in its preparation was entrusted to Technical Committee AMT/8, Additive manufacturing.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

**Additive manufacturing of polymers - Feedstock materials
- Qualification of materials for laser-based powder bed
fusion of parts (ISO/ASTM 52925:2022)**

Fabrication additive de polymères - Matières
premières - Qualification des matériaux pour la fusion
laser de pièces sur lit de poudre (ISO/ASTM
52925:2022)

Additive Fertigung von Polymeren
Qualifizierungsgrundsätze - Klassifizierung von
Teileigenschaften (ISO/ASTM 52925:2022)

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European foreword

This document (EN ISO/ASTM 52925:2022) has been prepared by Technical Committee ISO/TC 261 "Additive manufacturing" in collaboration with Technical Committee CEN/TC 438 "Additive Manufacturing" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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Endorsement notice

The text of ISO/ASTM 52925:2022 has been approved by CEN as EN ISO/ASTM 52925:2022 without any modification.

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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).

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This document was prepared by 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, and 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).

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Additive manufacturing of polymers — Feedstock materials — Qualification of materials for laser-based powder bed fusion of parts

1 Scope

This document provides guidance and recommendations for the qualification of polymeric materials intended for laser-based powder bed fusion of polymers (PBF-LB/P). The parameters and recommendations presented in this document relate mainly to the material polyamide 12 (PA12), but references are also made to polyamide 11 (PA11). The parameters and recommendations set forth herein cannot be applicable to other polymeric materials.

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

3 Terms and definitions

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

ISO and IEC maintain terminological 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 Symbols and abbreviations

4.1 Symbols

The following symbols are used throughout this document:

Symbols	Designation	Unit
D_{V10}	10 % quantile of particle size based on the sample volume	μm
D_{V50}	50 % quantile of particle size based on the sample volume	μm
D_{V90}	90 % quantile of particle size based on the sample volume	μm
H_R	Hausner ratio	—
s_r	standard deviation of repeatability	—
s_R	standard deviation of reproducibility	—
T_B	processing temperature range	$^{\circ}\text{C}$
T_{ic}	initial crystallisation temperature	$^{\circ}\text{C}$
T_{im}	initial melting temperature	$^{\circ}\text{C}$
V_{∞}	bulk volume	mL
V_0	tapped volume	mL

Symbols	Designation	Unit
η_{rel}	relative viscosity	—
ρ_{∞}	bulk density	g/mL
ρ_0	tapped density	g/mL

4.2 Abbreviations

The following abbreviations are used throughout this document:

DSC	differential scanning calorimetry
GPC	gel permeation chromatography
MFI	melt flow index
MFR	melt mass flow rate
MVR	melt volume flow rate
PA11	polyamide 11
PA12	polyamide 12
RoHS	restriction of the use of certain hazardous substances

5 Sampling

5.1 General

When analysing a small powder sample to determine its quality and suitability for PBF-LB/P, it shall be ensured that this sample is representative of the powder as a whole.

5.2 Characterisation of virgin powder and powder blends

Each new batch of virgin powder shall be tested and also each powder blend comprising used and virgin powder should be tested in accordance with the measurement methods listed in this document. Test of powder blend is recommended for series serial production to ensure consistent part quality. To minimise the scope of testing and ensure a high level of powder homogeneity, batch size of blended powder should be as large as possible.

5.3 Characterisation of used powder

Since different temperature histories within the used powder of a part cake can lead to significant differences in material quality, the total quantity of powder shall be homogenised to obtain a representative powder sample.

In practice this can be achieved by thoroughly blending the powder in a mixer, for example. Once blended, the sample can be taken from any part of the powder. If a sufficiently large mixer is not available, several samples (at least five, each with a mass of at least 20 g) may be taken from different areas and blended together. Samples for analysis may then be taken from this blend.

IMPORTANT — Ideally, the total volume of powder should be homogenised rather than individual samples. Ideally, the blending method should be validated.