

Lisäävän valmistuksen standardien tilannekatsaus

Tässä tilannekatsauksessa esitetään teknisen komitean ISO/TC 261 'Additive Manufacturing' laatimat julkaisut ja avoinna olevat työkohteet. Se on keskeinen lisäävän valmistuksen alan standardoinnin komitea, joka toimii tiiviissä yhteistyössä ASTM komitean F42 'Additive Manufacturing Technologies' sekä CEN/TC 438 'Additive Manufacturing' kanssa. Suurin osa lisäävän valmistuksen standardeista laaditaan ISO/ASTM standardeina, jotka sitten Euroopassa vahvistetaan myös EN ISO/ASTM -standardeina.

Lisäävän valmistuksen standardointiin vaikuttaa Suomessa METSTA:n standardointiryhmä SR 261 'Lisäävä valmistus'.

Selkeämpää luettavuutta tavoitellen standardit on tässä katsauksessa jaoteltu eri alaotsikoiden alle. Tämä jaottelu ei ole virallinen, eikä perustu esimerkiksi TC 261 alakomitealuokitteluun. Taulukoiden sarakkeissa FI tarkoittaa, että julkaisusta on suomenkielinen käännös. VA tarkoittaa, että ISO-työkohteesta on vastaava EN ISO -työkohde.

Lisätietoja: www.metsta.fi
suvi.papula@metsta.fi

Sisällys	Sivu
1. Terminologia ja yleiset periaatteet.....	1
2. Prosessit, menetelmät ja materiaalit.....	1
3. Suunnittelu ja data.....	2
4. Testaus, hyväksyntä ja pätevänti.....	3
5. Turvallisuus ja ympäristö	4

1. Terminologia ja yleiset periaatteet

Julkaisut:

FI	Tunnus	Otsikko
FI	EN ISO/ASTM 52900:2021	Additive manufacturing — General principles — Fundamentals and vocabulary Lisäävä valmistus – Yleiset periaatteet – Perusteet ja sanasto
	EN ISO 17295:2023	Additive manufacturing — General principles — Part positioning, coordinates and orientation
	EN ISO 17296-2:2016	Additive manufacturing — General principles — Part 2: Overview of process categories and feedstock
	EN ISO 17296-3:2016	Additive manufacturing — General principles — Part 3: Main characteristics and corresponding test methods
	EN ISO/ASTM 52901:2018	Additive manufacturing — General principles — Requirements for purchased AM parts
	EN ISO/ASTM 52950:2021	Additive manufacturing — General principles — Overview of data processing

Tekeillä:

VA	Tunnus	Otsikko	Vaihe	Vaiheen pvm
VA	ISO/ASTM FDIS 52927	Additive manufacturing — General principles — Main characteristics and corresponding test methods	Loppuäänestys alkaa	2.1.2024
VA	ISO/ASTM DIS 52953	Additive manufacturing for metals — General principles — Registration of geometric data acquired from process-monitoring and for quality control	Hyväksytty loppuäänestykseen	26.7.2023

2. Prosessit, menetelmät ja materiaalit

Julkaisut:

FI	Tunnus	Otsikko
	EN ISO/ASTM 52903-1:2021	Additive manufacturing — Material extrusion-based additive manufacturing of plastic materials — Part 1: Feedstock materials
	EN ISO/ASTM 52903-2:2020	Additive manufacturing — Material extrusion-based additive manufacturing of plastic materials — Part 2: Process equipment
	EN ISO/ASTM 52904:2020	Additive manufacturing — Process characteristics and performance — Practice for metal powder bed fusion process to meet critical applications
	EN ISO/ASTM 52907:2019	Additive manufacturing — Feedstock materials — Methods to characterize metal powders
	EN ISO/ASTM 52908:2023	Additive manufacturing of metals — Finished part properties — Post-processing, inspection and testing of parts produced by powder bed fusion
	EN ISO/ASTM 52909:2022	Additive manufacturing of metals — Finished part properties — Orientation and location dependence of mechanical properties for metal powder bed fusion
	EN ISO/ASTM 52925:2022	Additive manufacturing of polymers — Feedstock materials — Qualification of materials for laser-based powder bed fusion of parts
	CEN ISO/ASTM TR* 52952:2023	Additive manufacturing of metals — Feedstock materials — Correlating of rotating drum measurement with powder spreadability in PBF-LB machines

* = TR, Technical Report, informatiivinen julkaisu

Tekeillä:

VA	Tunnus	Otsikko	Vaihe	Vaiheen pvm
VA	ISO/ASTM FDIS 52928	Additive manufacturing of metals— Feedstock materials — Powder life cycle management	Loppuäänestys alkaa	20.2.2024
VA	ISO/ASTM DIS 52929	Additive manufacturing of metals — Powder bed fusion — Presentation of	Hyväksytty loppuäänestykseen	18.1.2024

		material properties in material data sheets		
VA	ISO/ASTM FDIS 52943-2	Additive manufacturing for aerospace — Process characteristics and performance — Part 2: Directed energy deposition using wire and arc	Loppuäänestys alkaa	23.1.2024
VA	ISO/ASTM DIS 52940	Additive manufacturing of ceramics — Feedstock materials — Characterization of ceramic slurry in vat photopolymerization	Lausuntovaihe rekisteröity	10.1.2024
	ISO/ASTM NP 52946	Additive manufacturing of metals — Finished part properties — Stainless Steel Alloys made by powder bed fusion	Työkohteäänestys alkaa	3.1.2024
	ISO/ASTM PWI 52947	Additive Manufacturing – Feedstock materials – Nickel alloy UNS N06625 for Powder bed fusion fusion	Alustava työkohte rekisteröity	22.4.2021
	ISO/ASTM PWI 52943-1	Additive manufacturing — Process characteristics and performance — Part 1: Standard specification for directed energy deposition using wire and beam in aerospace applications	Alustava työkohte rekisteröity	11.5.2021
	ISO/ASTM PWI 52962	Additive manufacturing for construction – General Principles – Design Process of Additively Manufactured Construction Elements	Alustava työkohte rekisteröity	24.8.2023
	ISO/ASTM PWI 52963	Additive manufacturing for construction – General Principles – Evaluation of Structural Printed Elements	Alustava työkohte rekisteröity	24.8.2023

3. Suunnittelu ja data

Julkaisut:

FI	Tunnus	Otsikko
	EN ISO/ASTM 52910:2019	Additive manufacturing — Design — Requirements, guidelines and recommendations
	EN ISO/ASTM 52911-1:2019	Additive manufacturing — Design — Part 1: Laser-based powder bed fusion of metals
	EN ISO/ASTM 52911-2:2019	Additive manufacturing — Design — Part 2: Laser-based powder bed fusion of polymers
	EN ISO/ASTM 52911-3:2023	Additive manufacturing — Design — Part 3: PBF-EB of metallic materials
	CEN ISO/ASTM TR* 52912:2020	Additive manufacturing — Design — Functionally graded additive manufacturing
	EN ISO/ASTM 52915:2020	Specification for additive manufacturing file format (AMF) Version 1.2
	CEN ISO/ASTM TR* 52916:2022	Additive manufacturing for medical — Data — Optimized medical image data

* = TR, Technical Report, informatiivinen julkaisu

Tekeillä:

VA	Tunnus	Otsikko	Vaihe	Vaiheen pvm
VA	ISO/ASTM CD 52957	Additive Manufacturing — Design — Parts using ceramic materials	Työkohte hyväksytty lausuntovaiheeseen	11.4.2023
	ISO/ASTM WD 52951	Additive Manufacturing — Data — Data packages for AM parts	Luonnoksen kommentointi alkaa	14.12.2023
	ISO/ASTM PWI 52914	Additive Manufacturing of Polymers — Design — Material extrusion of thermoplastics	Alustava työkohte rekisteröity	11.5.2021
VA	ISO/ASTM AWI 52922	Additive manufacturing — Design — Directed energy deposition of metals	Työkohte rekisteröity	24.10.2023

ISO/ASTM CD TR 52918 Additive manufacturing — Data formats — File format support, ecosystem and evolutions Komiteavaihe rekisteröity 29.1.2019

4. Testaus, hyväksyntä ja pätevänti

Julkaisut:

FI	Tunnus	Otsikko
	EN ISO/ASTM 52902:2023	Additive manufacturing — Test artefacts — Geometric capability assessment of additive manufacturing systems
	EN ISO/ASTM 52920:2023	Additive manufacturing — Qualification principles — Requirements for industrial additive manufacturing processes and production sites
	EN ISO/ASTM 52924:2023	Additive manufacturing of polymers — Qualification principles — Classification of part properties
	EN ISO/ASTM 52926-1:2023	Additive manufacturing of metals — Qualification principles — Part 1: General qualification of operators
	EN ISO/ASTM 52926-2:2023	Additive manufacturing of metals — Qualification principles — Part 2: Qualification of operators for PBF-LB
	EN ISO/ASTM 52926-3:2023	Additive manufacturing of metals — Qualification principles — Part 3: Qualification of operators for PBF-EB
	EN ISO/ASTM 52926-4:2023	Additive manufacturing of metals — Qualification principles — Part 4: Qualification of operators for DED-LB
	EN ISO/ASTM 52926-5:2023	Additive manufacturing of metals — Qualification principles — Part 5: Qualification of operators for DED-Arc
	EN ISO/ASTM 52935:2023	Additive manufacturing of metals — Qualification principles — Qualification of coordination personnel
	EN ISO/ASTM 52936-1:2023	Additive manufacturing of polymers — Qualification principles — Part 1: General principles and preparation of test specimens for PBF-LB
	EN ISO/ASTM 52939:2023	Additive manufacturing for construction — Qualification principles — Structural and infrastructure elements
	EN ISO/ASTM 52941:2020	Additive manufacturing — System performance and reliability — Acceptance tests for laser metal powder-bed fusion machines for metallic materials for aerospace application
	EN ISO/ASTM 52942:2020	Additive manufacturing — Qualification principles — Qualifying machine operators of laser metal powder bed fusion machines and equipment used in aerospace applications
	EN ISO/ASTM 52945:2023	Additive manufacturing for automotive — Qualification principles — Generic machine evaluation and specification of key performance indicators for PBF-LB/M processes
	CEN ISO/ASTM TR* 52905:2023	Additive manufacturing of metals — Non-destructive testing and evaluation — Defect detection in parts
	CEN ISO/ASTM TR* 52906:2022	Additive manufacturing — Non-destructive testing — Intentionally seeding flaws in metallic parts
	CEN ISO/ASTM TR* 52917:2022	Additive manufacturing — Round robin testing — General guidelines
	CEN ISO/ASTM TS** 52930:2021	Additive manufacturing — Qualification principles — Installation, operation and performance (IQ/OQ/PQ) of PBF-LB equipment

* = TR, Technical Report, informatiivinen julkaisu

** = TS, Technical Specification, normatiivinen dokumentti

Tekeillä:

VA	Tunnus	Otsikko	Vaihe	Vaiheen pvm
VA	ISO/ASTM DIS 52941	Additive manufacturing — System performance and reliability — Acceptance tests for laser metal powder-bed fusion machines for metallic materials for aerospace application	Hyväksytty loppuäänestykseen	5.1.2024
VA	ISO/ASTM DIS 52948	Additive manufacturing for metals — Non-destructive testing and evaluation — Imperfections classification in PBF parts	Hyväksytty loppuäänestykseen	18.1.2024

VA	ISO/ASTM DIS 52919	Additive manufacturing — Qualification principles — Test methods for metal casting sand moulds	Lausuntovaihe alkaa	17.1.2024
VA	ISO/ASTM CD 52937	Additive Manufacturing of metals — Qualification principles — Tasks and related skills for AM	Työkohde hyväksyty lausuntovaiheeseen	14.9.2023
VA	ISO/ASTM CD TR* 52958	Additive Manufacturing of Metals — Powder Bed Fusion (PBF) — Best Practice for In-Situ Flaw Detection and Analysis for Laser-based PBF	Työkohde hyväksyty lausuntovaiheeseen	11.4.2023
VA	ISO/ASTM WD TS** 52949	Additive manufacturing of metals — Qualification principles — Installation, operation and performance (IQ/OQ/PQ) of PBF-EB equipment	Hyväksyty komiteavaiheeseen	27.7.2023
VA	ISO/ASTM DIS 52959	Additive Manufacturing of metals — Test artefacts — Compression validation coupons for lattice designs	Lausuntovaihe alkaa	16.1.2024
VA	ISO/ASTM AWI 52965	Additive manufacturing for metals — Qualification principles — Test method for indentation plastometry	Työkohde rekisteröity	9.1.2024

** = TS, Technical Specification, normatiivinen dokumentti

5. Turvallisuus ja ympäristö

Julkaisut:

FI	Tunnus	Otsikko
	EN ISO/ASTM 52931:2023	Additive manufacturing of metals — Environment, health and safety — General principles for use of metallic materials

Tekeillä:

VA	Tunnus	Otsikko	Vaihe	Vaiheen pvm
VA	ISO/ASTM 52933	Additive manufacturing — Environment, health and safety — Test method for the hazardous substances emitted from material extrusion type 3D printers in the non-industrial places	Rekisteröity julkaistavaksi	20.2.2024
VA	ISO/ASTM DIS 52938-1	Additive manufacturing of metals — Environment, health and safety — Part 1: Safety requirements for PBF-LB machines	Hyväksyty loppuäänestykseen	26.7.2023
VA	ISO/DIS 27548	Additive manufacturing of plastics — Environment, health, and safety — Test method for determination of particle and chemical emission rates from desktop material extrusion 3D printer	Hyväksyty loppuäänestykseen	26.7.2023
	ISO/ASTM PWI 52961	Additive manufacturing of polymers – Environment, health and safety – General principles for use of polymers	Alustava työkohde rekisteröity	11.4.2023
	ISO/ASTM PWI 52964	Additive manufacturing – Environment, health and safety – Qualification principles for life cycle assessment of parts and processes	Alustava työkohde rekisteröity	25.9.2023