

# ISO/ASTM 52904:2024-07 (E)

## Additive manufacturing of metals - Process characteristics and performance - Metal powder bed fusion process to meet critical applications

---

### Contents

Page

- Foreword ..... v
- Introduction ..... vi
- 1 Scope ..... 1
- 2 Normative references ..... 1
- 3 Terms and definitions ..... 1
- 4 Personnel requirements ..... 2
- 5 Digital data ..... 2
  - 5.1 Digital data records ..... 2
  - 5.2 Digital data processing ..... 2
- 6 PBF equipment requirements ..... 3
  - 6.1 General ..... 3
  - 6.2 Build consumables ..... 3
    - 6.2.1 Build platform ..... 3
    - 6.2.2 Shielding gases ..... 3
    - 6.2.3 Powder spreading device ..... 3
    - 6.2.4 Compressed air ..... 3
  - 6.3 Auxiliary tools and equipment ..... 4
  - 6.4 Machine operating software ..... 4
  - 6.5 Environmental controls ..... 4
- 7 Feedstock requirements ..... 4
  - 7.1 Purchasing feedstock ..... 4
  - 7.2 Control of feedstock ..... 4
- 8 Qualification ..... 5
  - 8.1 Design checks ..... 5
    - 8.1.1 Part files ..... 5
    - 8.1.2 Machining allowance ..... 5
    - 8.1.3 Orientation and location ..... 5
    - 8.1.4 Parts nesting ..... 5
  - 8.2 Pre-build checks ..... 5
    - 8.2.1 General ..... 5
    - 8.2.2 Maintenance and calibration status ..... 5
    - 8.2.3 PBF machine elements and systems ..... 6
    - 8.2.4 Build chamber environment ..... 6
    - 8.2.5 Build platform ..... 6
    - 8.2.6 Powder spreading device ..... 6
    - 8.2.7 Gas supply ..... 6
    - 8.2.8 Feedstock condition and quantity ..... 6
    - 8.2.9 Baseline machine and process parameters ..... 7
  - 8.3 Periodic preventive maintenance ..... 7
    - 8.3.1 General ..... 7
    - 8.3.2 Energy delivery verification ..... 7
    - 8.3.3 Z-axis movement ..... 7
    - 8.3.4 Compressed air ..... 7
    - 8.3.5 Oxygen and vacuum ..... 7
    - 8.3.6 Laser field alignment (LFA) ..... 7
    - 8.3.7 Other recommended preventive maintenance ..... 8

8.4	Machine, process, and part qualification .....	8
8.4.1	Process qualification .....	8
8.4.2	Build platform.....	8
8.4.3	Test specimens.....	8
8.4.4	Requalification.....	9
8.5	Consolidated material and part.....	9
8.5.1	Material properties.....	9
8.5.2	Part properties.....	10
8.5.3	Non-conformities.....	10
<b>9</b>	<b>Manufacturing plan and documentation .....</b>	<b>10</b>
9.1	Manufacturing plan.....	10
9.2	Documentation.....	11
	<b>Annex A (informative) Example of a manufacturing plan.....</b>	<b>12</b>
	<b>Bibliography.....</b>	<b>15</b>