

# DIN EN ISO/ASTM 52941:2026-11 (E)

## Additive manufacturing for aerospace - System performance and reliability tests for laser metal powder-bed fusion machines for metallic materials (ISO/ASTM 52941:2026)

---

### Contents

|                                                                                                     | Page      |
|-----------------------------------------------------------------------------------------------------|-----------|
| Foreword.....                                                                                       | iv        |
| <b>1 Scope.....</b>                                                                                 | <b>1</b>  |
| <b>2 Normative references.....</b>                                                                  | <b>1</b>  |
| <b>3 Terms and definitions.....</b>                                                                 | <b>1</b>  |
| <b>4 Equipment.....</b>                                                                             | <b>2</b>  |
| <b>5 Environmental and operational conditions.....</b>                                              | <b>2</b>  |
| <b>6 Qualification testing.....</b>                                                                 | <b>2</b>  |
| 6.1 General.....                                                                                    | 2         |
| 6.2 Laser beam tests.....                                                                           | 2         |
| 6.2.1 Testing the laser power for continuous wave lasers.....                                       | 2         |
| 6.2.2 Testing the laser power stability for continuous wave lasers.....                             | 3         |
| 6.2.3 Testing of pulsed wave lasers.....                                                            | 3         |
| 6.2.4 Evaluation of the laser beam characteristics.....                                             | 3         |
| 6.2.5 Evaluation of the minimum laser beam waist position in different working plane locations..... | 3         |
| 6.2.6 Evaluation of the thermal stability of the minimum beam waist position.....                   | 3         |
| 6.2.7 Testing the laser beam position.....                                                          | 4         |
| 6.2.8 Trajectory accuracy.....                                                                      | 4         |
| 6.2.9 Scanning speed.....                                                                           | 4         |
| 6.2.10 Requirements for equipment with multiple laser beam sources.....                             | 4         |
| 6.3 Mechanical function test.....                                                                   | 5         |
| 6.3.1 General.....                                                                                  | 5         |
| 6.3.2 Build platform positioning.....                                                               | 5         |
| 6.3.3 Feeding platform positioning.....                                                             | 5         |
| 6.3.4 Other powder feed processing mechanics.....                                                   | 5         |
| 6.3.5 Movement of the powder spreading device.....                                                  | 5         |
| 6.4 Heating system.....                                                                             | 6         |
| 6.5 Atmosphere inside the working space.....                                                        | 6         |
| 6.6 Data recording.....                                                                             | 6         |
| 6.7 Safety systems.....                                                                             | 6         |
| 6.8 Optional tests.....                                                                             | 6         |
| 6.8.1 Demonstrators and test artefacts.....                                                         | 6         |
| 6.8.2 Build area assessment.....                                                                    | 6         |
| 6.8.3 Gas flow test by hot wire anemometer.....                                                     | 7         |
| 6.9 Requalification.....                                                                            | 8         |
| <b>7 Test report.....</b>                                                                           | <b>8</b>  |
| <b>Annex A (informative) Example of a test report.....</b>                                          | <b>10</b> |
| <b>Annex B (informative) Geometric pattern for the trajectory accuracy test.....</b>                | <b>11</b> |
| <b>Bibliography.....</b>                                                                            | <b>12</b> |