ACME METALS

**Manufacturer**

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**Customer**

**European Research Institute**

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## Digital Material Passport

| | | | |
|---|---|---|---|
| *ID* | DMP-METAL-005 | *Version* | 1.0.0 |
| *Issue Date* | 2025-05-17 | *Certificate Type* | EN 10204 3.1 |

## Business Transaction

| **Order** | | **Delivery** | |
|---|---|---|---|
| *Order ID* | PO-23456 | *Delivery ID* | DN-65432 |
| *Position* | 1 | *Position* | 1 |
| *Date* | 2025-05-01 | *Date* | 2025-05-16 |
| *Quantity* | 1000 kg | *Quantity* | 1000 kg |

## Product Information

| | |
|---|---|
| *Product Name* | Titanium Alloy Ti-6Al-4V ELI |
| *Batch ID* | T-65432-01 |
| *Heat Treatment* | Annealed |
| *Surface Condition* | Machined |
| *Production Date* | 2025-05-15 |
| *Country of Origin* | DE |

**Product Norms**

| | |
|---|---|
| *Designation* | ASTM F136 (2022) |

**Material Designations**

| | |
|---|---|
| *System* | UNS |
| *Designation* | R56401 |

**Product Shape**

| | |
|---|---|
| *Form* | RoundBar |
| *Length* | 3000 mm |
| *Diameter* | 30 mm |

## Chemical Analysis

| | |
|---|---|
| *Heat Number* | T-65432 |
| *Melting Process* | VAR |
| *Casting Date* | 2025-05-14 |
| *Sample Location* | Product |

**Elements**

| *Symbol* | **Ti** | **Al** | **V** | **Fe** | **O** | **C** | **N** | **H** |
|---|---|---|---|---|---|---|---|---|
| *Unit* | % | % | % | % | % | % | % | % |
| *Min* | - | 5.5 | 3.5 | - | - | - | - | - |
| *Max* | - | 6.5 | 4.5 | 0.25 | 0.13 | 0.08 | 0.05 | 120 |
| *Actual* | 89.32 | 6.02 ± 0.05 | 3.95 ± 0.03 | 0.18 | 0.11 | 0.026 | 0.012 | 35 |

## Mechanical Properties

| *Property* | *Symbol* | *Actual* | *Minimum* | *Maximum* | *Method* | *Status* |
|---|---|---|---|---|---|---|
| Fatigue Test | | Array data (see - below) | | | ASTM E466 | ✓ |

| **Cycles (N)** | 10000 | 50000 | 100000 | 500000 | 1000000 | 10000000 |
|---|---|---|---|---|---|---|
| | 650 | 635 | 610 | 590 | 570 | 550 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Notch Sensitivity | | 0.85 - 0.92 | | | Internal Method TS-5432 | ✓ |

## Physical Properties

| *Property* | *Symbol* | *Actual* | *Target/Min* | *Maximum* | *Method* | *Status* |
|---|---|---|---|---|---|---|
| Density | | 4.43 ± 0.01 g/cm³ | 4.43 | | ASTM B311 | ✓ |

## Supplementary Tests

| *Property* | *Actual* | *Target/Min* | *Maximum* | *Method* | *Status* |
|---|---|---|---|---|---|
| Microstructure Examination | Equiaxed alpha with intergranular beta | - | | ASTM E407 | ✓ |
| Ultrasonic Inspection | Yes<br>No indications greater than reference standard | - | | ASTM E2375 | ✓ |
| Surface Quality Assessment | Class 1 - Medical Grade | - | | Visual Inspection per ASTM F136 | ✓ |
| Alpha Case Depth | 5 µm | - | 25 | Microhardness Traverse | ✓ |
| Grain Size Distribution | 8 - 10 ASTM No. | 7 - 12 | | ASTM E112 | ✓ |
| Hardness Profile | Array data (see below) | - | | ASTM E384 | ✓ |

| **Distance from - surface (mm)** | 0.1 | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 10.0 | 15.0 |
|---|---|---|---|---|---|---|---|---|
| **[HV]** | 345 | 350 | 352 | 350 | 349 | 348 | 351 | 347 |

## Validation

We hereby certify that the material described above has been manufactured and tested in accordance with ASTM F136 and meets all requirements for surgical implant applications.

**Validated By**

| *Name* | *Title* | *Department* | *Date* |
|---|---|---|---|
| Dr. Markus Weber | Head of Metallurgy | Research & Quality | 2025-05-17 |

Data schema maintained by Material Identity. https://schemas.materialidentity.org/metals-schemas/v0.0.1/schema.json