**CUSTOMER APPROVAL & NADCAP CAPABILITY MEMORANDUM**

**To:** Whomever It may applicable to.

**Subject:** Approved Laboratory Testing & Metallurgical Capabilities

## Scope of Approval

This memorandum is intended to summarize the currently approved laboratory capabilities maintained by Element Charlotte in support of applicable Rolls-Royce Plc approval requirements and associated accredited testing activities.

All capabilities identified within this memorandum are performed within our active Nadcap and A2LA ISO/IEC 17025:2017 accredited laboratory quality systems and are controlled in accordance with applicable industry standards, customer specifications, internal quality procedures, PRI/Nadcap requirements, and ISO/IEC 17025:2017 accreditation requirements.

Element Charlotte maintains qualified personnel, calibrated equipment, validated laboratory procedures, and documented process controls necessary to support materials characterization, mechanical testing, metallurgical evaluation, and chemical analysis activities.

## Accreditation Alignment

The approvals identified herein are maintained under the Element Charlotte Nadcap and A2LA ISO/IEC 17025:2017 accredited laboratory quality systems.

Per documented Rolls-Royce approval correspondence and audit communications, ISO/IEC 17025:2017 accreditation is recognized as acceptable for the identified testing scope when testing is performed at the accredited Charlotte facility. Additionally, Element Charlotte is authorized to perform Spot Micro testing under its active ISO/IEC 17025:2017 accredited laboratory quality system when testing is conducted at the accredited Charlotte facility.

These approvals support applicable Rolls-Royce requirements associated with:

- Mechanical Testing
- Metallurgical Evaluation
- Chemical Analysis
- Hardness Testing
- Fracture Mechanics
- Microscopy & Failure Analysis
- Laboratory Specimen Preparation Activities

## Approved Customer (Rolls-Royce) Capabilities

### Mechanical Testing

| Standard / Method | Capability | Laboratory Method | Status |
|---|---|---|---|
| EN 10045-1 / ASTM E23 | Charpy Impact | Charpy V-Notch Impact Testing | Approved |
| EN 2002-5 / ASTM E139 | Stress Rupture | Creep / Stress Rupture Testing | Approved |

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|---|---|---|---|
| ASTM E139 | Creep Strain | Creep Testing | Approved |
| BS 131 / ASTM E23 | Izod Impact | Izod Impact Testing | Approved |
| ASTM E292 | Notched Stress Rupture | Notched Stress Rupture Testing | Approved |
| EN 2002-1 / ASTM E8 | Tensile – Ambient Temperature | Tensile Testing – Ambient Temperature | Approved |
| EN 2002-2 / ASTM E21 | Tensile – Elevated Temperature | Tensile Testing – Elevated Temperature | Approved |

**Chemical Analysis**

| Standard / Method | Capability | Laboratory Method | Status |
|---|---|---|---|
| ASTM E1019 | Carbon / Sulfur | Combustion Analysis – Carbon / Sulfur | Approved |
| ASTM E1447 | Hydrogen in Titanium | Inert Gas Fusion – Hydrogen Analysis | Approved |
| ASTM E1409 / ASTM E1019 | O/N/H Analysis (Fusion) | Inert Gas Fusion – Oxygen / Nitrogen / Hydrogen | Approved |
| ASTM E415 | Optical Emission Spectroscopy (OES) | Optical Emission Spectroscopy (Spark / Arc) | Approved |

**Metallurgical Evaluation**

| Standard / Method | Capability | Laboratory Method | Status |
|---|---|---|---|
| ASTM E112 | Grain Size | Grain Size Determination | Approved |
| ASTM E45 | Inclusion Rating | Inclusion Rating / Cleanliness Evaluation | Approved |
| ASTM E3 / ASTM E407 | Metallography | Metallographic Examination | Approved |
| ASTM E1508 | SEM / EDS | Scanning Electron Microscopy / Energy Dispersive Spectroscopy | Approved |
| Customer / OEM Specification | Spot Micro Testing | Metallographic Evaluation – Spot Micro | Approved |

**Hardness Testing**

| Standard / Method | Capability | Laboratory Method | Status |
|---|---|---|---|
| ASTM E18 / ASTM E10 / ASTM E92 | Hardness (Rockwell / Brinell / Vickers / Knoop) | Hardness Testing – Rockwell / Brinell / Vickers / Knoop | Approved |

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**Laboratory Support Processes**

| Standard / Method | Capability | Laboratory Method | Status |
|---|---|---|---|
| Customer / OEM Specification | Low Stress Grinding (LSG) | Specimen Preparation – Low Stress Grinding | Approved |
| Customer / OEM Specification | Specimen Polish | Specimen Preparation – Surface Finishing / Polishing | Approved |
| Customer / OEM Specification | Test Piece Machining | Test Specimen Preparation / Machining | Approved |

## Quality Commitment

Element Charlotte remains committed to maintaining Nadcap and ISO/IEC 17025:2017 accreditation compliance, customer-specific approval requirements, technical competence, equipment calibration and traceability, and continuous quality improvement to ensure accurate, reliable, and technically compliant laboratory results supporting aerospace applications.

## Controlled Approval Statement

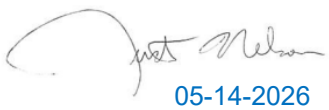
Rolls-Royce approvals identified within this memorandum are maintained through the Element Charlotte Nadcap and A2LA ISO/IEC 17025:2017 accredited laboratory quality systems and remain subject to ongoing accreditation compliance, internal quality surveillance, proficiency validation, and customer oversight requirements.

Nadcap and A2LA accreditation certificates and detailed scope information are available upon request.

## Current Approval Status

Element Charlotte currently maintains APPROVED status for all capabilities identified within this memorandum supporting applicable Rolls-Royce plc approval requirements under the active Nadcap and A2LA ISO/IEC 17025:2017 accreditation scopes.

## Memo Approval



05-14-2026

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General Manager

05-14-2026

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Quality Manager

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