



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELEMENT BROKEN ARROW  
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MECHANICAL

Valid To: September 30, 2026

Certificate Number: 1089.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following types of tests on fasteners, metals, alloys, adhesives and sealants, aircraft components, automotive components, coatings, films, packaging, gaskets, seals and packings; composites; plastics and polymers; pipes, hoses, rubber and rubber products.

| <u>Test</u>                                                                         | <u>Test Method(s)</u>                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Metallurgical Testing</u></b>                                                 |                                                                                                                                                                                                |
| Tension                                                                             | ASME Section IX; BS EN 895:1995 (Withdrawn 2011); EN10002-1:2001 (Withdrawn 2009); ASTM A370 (Sections 6-14), A770/770M, A1034/1034M <sup>1</sup> , B557/B557M, E8/E8M, E111; ISO 4136, 6892-1 |
| Bend                                                                                | API 1104; ASME Section IX; ASTM A6/A6M, A370 (Section 15), E190, E290; AWS D1.1/D1.1M, D1.5/D1.5M, D17.1/D17.1M, B2.1/B2.1M; EN910 (Withdrawn 1996); ISO 15614-1, 5173; SOP A203               |
| Hardness                                                                            |                                                                                                                                                                                                |
| Portable Hardness (HRC)                                                             | ASTM A1038, E110; SOP A206                                                                                                                                                                     |
| Brinell (3000 kgf)                                                                  | ASTM A370 (Section 17), F606/F606M, E10                                                                                                                                                        |
| Rockwell Hardness (HRA, HRBW, HRC, HREW, HRFW, HRHW)                                | ASTM E18, A370 (Section 18), F606/F606M; NASM-1312-6                                                                                                                                           |
| Superficial Rockwell Hardness (HR15N, HR30N, HR45N, HR15TW, HR30TW, HR45TW, HR15WW) | ASTM E18, A370 (Section 18); NASM-1312-6                                                                                                                                                       |
| Vickers (1 to 10) kgf                                                               | ASTM E92, F606/F606M                                                                                                                                                                           |
| Charpy Impact (-325 to 80) °F (U- and V- Notch)                                     | ASTM A370 (Section 20-27), E23, A923; ISO 148-1                                                                                                                                                |
| Flattening                                                                          | API 1104; ASTM A370 (Section A.2.5.1.1); A530/A530M (Section 21), A1016/A1016M (Section 19), A999/A999M (Section 21), A450/A450M (Section 18); SOP A208                                        |

| <b><u>Test</u></b>                           | <b><u>Test Method(s)</u></b>                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Metallurgical Testing (cont'd)</u></b> |                                                                                                                                                                                                                                                                                                                                                                    |
| Flare & Flange Test                          | ASTM A370 (Section A 2.5.1.4, A 2.5.1.5), A450/A450M, A1016A/A1016M                                                                                                                                                                                                                                                                                                |
| Nick Break                                   | API 1104 (Section 5.6.3); AWS B4.0 (Section 9.1)                                                                                                                                                                                                                                                                                                                   |
| Electrical Conductivity                      | ASTM E1004; EN 2004-1, EN 2004-7                                                                                                                                                                                                                                                                                                                                   |
| Visual Examination                           | ASME Section IX                                                                                                                                                                                                                                                                                                                                                    |
| Fillet Weld Fracture                         | ASME Section IX (QW-182)                                                                                                                                                                                                                                                                                                                                           |
| <b><u>Tensile Test of Fasteners</u></b>      |                                                                                                                                                                                                                                                                                                                                                                    |
| Axial Tensile (Up to ½ in)                   | ASTM A370 (Section A3.2), E8/E8M, F606/F606M; NASM-1312-8                                                                                                                                                                                                                                                                                                          |
| Proof Load (Interior & exterior thread)      | ASTM A370 (Section A3.2), F606/F606M; NASM-1312-8                                                                                                                                                                                                                                                                                                                  |
| Wedge Tensile (Up to ½ in)                   | ASTM A370 (Section A3.2.1.6), F606/F606M; SAE J429                                                                                                                                                                                                                                                                                                                 |
| <b><u>Shear Test of Fasteners</u></b>        |                                                                                                                                                                                                                                                                                                                                                                    |
| Double Shear                                 | ASTM B565, F606/F606M; NASM-1312-13, ASTM B769                                                                                                                                                                                                                                                                                                                     |
| <b><u>Torque Tests of Fasteners</u></b>      |                                                                                                                                                                                                                                                                                                                                                                    |
| Threaded Fasteners                           | NASM-1312-31                                                                                                                                                                                                                                                                                                                                                       |
| Self-Locking Nuts                            | NASM-25027, 85730                                                                                                                                                                                                                                                                                                                                                  |
| <b><u>Metallographic Evaluation</u></b>      |                                                                                                                                                                                                                                                                                                                                                                    |
| Metallographic Preparation                   | ASTM E3                                                                                                                                                                                                                                                                                                                                                            |
| Grain Size                                   | ASTM E112, E930                                                                                                                                                                                                                                                                                                                                                    |
| Macro Etching                                | ASTM E340, E381                                                                                                                                                                                                                                                                                                                                                    |
| Micro Etching                                | ASTM E407                                                                                                                                                                                                                                                                                                                                                          |
| Microstructure                               | ASTM A247                                                                                                                                                                                                                                                                                                                                                          |
| Inclusion Content                            | ASTM E45 (Method A)                                                                                                                                                                                                                                                                                                                                                |
| Case Depth                                   | ASTM E1077 (except Section 7.5 Chemical Analysis Method); SAE J423 (except Section 4 Chemical Analysis Method)                                                                                                                                                                                                                                                     |
| Visual and Macroscopic Evaluation of Welds   | AMS-STD-1595A 1998 (Cancelled 2002); API 1104; ASME Sec IX, VIII-Div 1; AWS B2.1/B2.1M, B2.2/B2.2M, D1.1/D1.1M, D1.2/D1.2M, D1.4/D1.4M, D1.5/D1.5M, D1.6/D1.6M, D17.1/D17.1M; BS EN 287-1 (Withdrawn 2011), 1321:1997 (Withdrawn 2013); BS EN ISO 15614-1, 15614-8; ISO 5817, 15614-5, 17637, 17639; CSA W47.1; EN ISO 9606-1, 9606-4; NAVSEA S9074-AQ-GIB-010/248 |

| <b><u>Test</u></b>                                             | <b><u>Test Method(s)</u></b>                                                     |
|----------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b><u>Metallographic Evaluation (cont'd)</u></b>               |                                                                                  |
| Microhardness                                                  |                                                                                  |
| Knoop (100 to 1000) gf                                         | ASTM B578, E92, E384, F606/F606M;<br>NASM 1312-6; NAVSEA S9074-GIB-010/248       |
| Vickers (100 to 1000) gf                                       | ASTM B578, E92, E384, F606/F606M;<br>NASM 1312-6                                 |
| Microscopic Determination of                                   |                                                                                  |
| Constituent Percent                                            | ASTM A800/A800M, E562, E1245                                                     |
| Plating Thickness                                              | ASTM B487; ISO 1463; NASM-1312-12                                                |
| Failure Analysis                                               | SOP-G200, ASM Handbook Volume 11 (using<br>test methods contained in this scope) |
| Hydrostatic Pressure Testing                                   | SOP G202; ASTM E1003-13                                                          |
| Scanning Electron Microscope/Energy Dispersive<br>Spectroscopy | ASTM B748, E1508, ASM Handbook Volume<br>12                                      |
| <b><u>Environmental Exposure Simulation</u></b>                |                                                                                  |
| Effects of Liquids (Rubber)                                    | ASTM D471                                                                        |
| <b><u>Hardness</u></b>                                         |                                                                                  |
| Durometer Type: A, M, D                                        | ASTM D2240                                                                       |
| <b><u>Impact</u></b>                                           |                                                                                  |
| Izod/Charpy                                                    | ASTM D256, D4812, D6110                                                          |
| <b><u>Mechanical Properties</u></b>                            |                                                                                  |
| Tensile                                                        | ASTM D412, D638, D695, D1414 (Section 8),<br>D1708; ISO 527-1                    |
| Peel                                                           | ASTM D1876, D3167                                                                |
| Shear                                                          | ASTM D1002                                                                       |
| Tear                                                           | ASTM D624                                                                        |
| Flexural Properties of Plastics                                | ASTM D790; ISO 178                                                               |
| <b><u>Physical Properties</u></b>                              |                                                                                  |
| Density/Specific Gravity                                       | ASTM D792, D297                                                                  |
| Taber Abrasion                                                 | ASTM D4060; MIL-A-8625                                                           |
| <b><u>Corrosion/Environmental Testing</u></b>                  |                                                                                  |
| Coating Evaluation                                             | ASTM D610, D714, D1654, D3359                                                    |
| Humidity                                                       | ASTM D1735, D4585/D4585M                                                         |
| Salt Spray (Fog)                                               | ASTM B117                                                                        |
| UV (Xenon, Fluorescent)                                        | ASTM G151, G154, G155                                                            |

## I. Dimensional Testing<sup>2</sup>

| Parameter           | Range                                  | CMC <sup>3</sup> ( $\pm$ )           | Technique / Standards                                                                 |
|---------------------|----------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|
| Linear <sup>4</sup> | Up to 1 in<br>Up to 2 in<br>Up to 6 in | 0.000054 in<br>0.0002 in<br>0.001 in | Digital Micrometer/ASME Y14.5<br>Optical Comparator/ASME Y14.5<br>Calipers/ASME Y14.5 |
| Angle <sup>4</sup>  | (0 to 45) $^{\circ}$                   | 0.048 $^{\circ}$                     | Optical Comparator/ASME Y14.5                                                         |

<sup>1</sup> This laboratory meets the requirements of *ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection* for the testing of steel construction materials, steel reinforcing bars, and qualification of welding personnel.

<sup>2</sup> This laboratory offers commercial dimensional testing service only.

<sup>3</sup> Calibration and Measurement Capability (CMC) uncertainty is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine measurements of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capability uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific measurement performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific measurement.

<sup>4</sup> This test is not equivalent to that of a calibration.



# Accredited Laboratory

A2LA has accredited

## ELEMENT BROKEN ARROW

*Broken Arrow, OK*

for technical competence in the field of

### Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 25<sup>th</sup> day of November 2024.

A blue ink signature of Mr. Trace McInturff, written in a cursive style.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1089.01  
Valid to September 30, 2026

*For the types of tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.*