SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

NATIONAL TECHNICAL SYSTEMS (NTS) – BALTIMORE
5 North Park Drive
Hunt Valley, MD 21030
Mrs. Sarah D. Brammer Phone: 410 584 9099

MECHANICAL

Valid To: December 31, 2018 Certificate Number: 0214.35

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on the following product types: Aerospace, Automotive, Avionics, Consumer Products, Electronics, Industrial, Medical, Military Telecommunication and Textiles.

Test Technology:	**Test Method(s):**
Plating Adhesion	IPC-TM-650 (Section 2.4.1); IEC 60664; IEC 61086
Strength/Compression (Bond Strength, Lap Shear Strength, Shear Strength, Compression/Compression Strength, Tension/Tensile Strength, Tack, Tear Strength, Tear Resistance, Propagation Tear, Peel Strength, Scratch Resistance) Range: Up to 10,000 lbs (-170 to 425) °C	ASTM D638; IPC-TM-650 (Sections 2.4.8, 2.4.8.1, 2.4.18, 2.4.18.1, 2.4.21, and 2.4.44); MIL-STD-883, Method 5011; UL 796; IEC 60664
Bow and Twist/Warpage	IPC-TM-650 (Section 2.4.22.1); IPC-TM-650 (Section 2.4.22)
Failure Analysis using Techniques Included in Method O-17 or in the Chemical, Electrical and/or Mechanical Scope	BAL O-17[1]
Electronic Part Authenticity Testing/Counterfeit Detection	BAL O-27[1]; SPOC-419 (*Excluding Paragraphs 9 to 13*)
Flammability	UL 94 (Sections 7 and 8)
Flexibility Endurance/Folding Flexibility	IPC-TM-650 (Section 2.4.3); MIL-P-50884[2]; IEC 61086

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8398 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Test Technology:	**Test Method(s):**
Fungus Resistance (Non-Nutrient Growth)	ASTM G21; IPC-TM-650 (Sections 2.6.1 and 2.6.1.1); MIL-STD-810; MIL-I-46058[2] Amendment 7 (Sections 3.7 and 4.8.4); IEC 61086
Hardness (Pencil, Shore A, Shore D, Shore O, Knoop, Vickers)	ASTM D3363; ASTM D2240; ASTM E92; ASTM E384; IPC-TM-650 (Section 2.4.27.2)
Temperature/Humidity Exposure/Damp Heat Range: (10 to 98) %RH (-170 to 500) °C	IPC-TM-650 (Sections 2.6.11 and 2.6.15); Delphi/Delco Q-1000, Methods 105 and 106; MIL-STD-202, Method 108; IEC 60664; IEC 61086
Corrosion of Flux using Temperature/Humidity Chamber	IPC-TM-650 (Section 2.6.15)
Hydrolytic Stability/Temperature/Humidity Aging	IPC-TM-650 (Sections 2.6.11 and 2.6.11.1); MIL-I-46058[2]
Life at Elevated Ambient Temperature	MIL-STD-202, Method 108
High/Low Temperature Exposure Range: (-75 to 180) °C	IPC-TM-650 (Sections 2.6.11 and 2.6.15); Delphi/Delco Q-1000, Methods 105 and 106; MIL-STD-202, Method 108; IEC 60664; IEC 61086
Shelf Life	MIL-I-46058[2]; IPC-CC-830
Microscopic Evaluation/Visual Examination/ Microsection Analysis (Cross-Section) (3 to 10,000x)	Delphi/Delco Q-1000, Method: Cross-section Analysis, 105, 106, and 201; IPC-TM-650 (Sections 2.1.1, 2.1.2, 2.1.5, and 2.1.10); IEC 60664; IEC 61086
Solder Slump	IPC-TM-650 (Section 2.4.35)
Thickness – Micrometer	ASTM D1005; MIL-I-46058[2]
Goniometer/Hydrophobic Contamination/ Contact Angle/Surface Wettability	ASTM C813; ASTM D7334
Ultraviolet Exposure	ASTM G154
Xenon Arc Exposure	ASTM G155

Test Technology:	**Test Method(s):**
Shock (Thermal Shock, Air-to-Air, Liquid-to-Liquid, Thermal Cycling, Temperature Cycling, Rapid Change of Temperature) Range: (-75 to 180) °C	Delphi/Delco Q-1000, Method 101; IPC-TM-650 (Sections 2.6.7, 2.6.7.1, and 2.6.7.2); MIL-STD-202, Method 107; IEC 60664; IEC 61086
Solderability/Steam Aging	Delphi/Delco Q-1000, Method 202; IPC-J-STD-002; IPC-J-STD-003
Rework Simulation/Thermal Stress/ Solder Shock/Resistance to Soldering Heat	IPC-TM-650 (Sections 2.4.13.1, 2.4.36, and 2.6.8); MIL-STD-202, Method 210; IEC 60664
Water Absorption/Moisture Absorption	ASTM D570; IPC-TM-650 (Sections 2.6.2 and 2.6.2.1)
Water Vapor Transmission	ASTM E96
X-Ray Radiography	MIL-STD-883, Method 2012
Instrumental Color Difference Measurements for Exterior Finishes, Textiles, and Colored Trim	SAE J545

Supporting the following documents: IPC-SM-840, IPC-CC-830, IPC-6012, IPC-6013, MIL-A-28870, MIL-I-46058, MIL-P-50884, MIL-PRF-31032, MIL-PRF-55110, IPC-J-STD-004, IPC-J-STD-005

This laboratory also uses customer supplied specifications and/or methods directly related to the testing technologies and parameters listed above.

Facility studies performed according to IPC-QL-653 “Certification of Facilities that Inspect/Test Printed Boards, Components and Materials.”

[1] In-house Test Method.

[2] This laboratory’s scope contains withdrawn or superseded methods. As a clarifier, this indicates that the applicable method itself has been withdrawn or is now considered “historical” and not that the laboratory’s accreditation for the method has been withdrawn.

Accredited Laboratory

A2LA has accredited

NATIONAL TECHNICAL SYSTEMS (NTS) BALTIMORE

Hunt Valley, MD

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *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 8 January 2009*).

Presented this 25th day of January 2017.

President and CEO
For the Accreditation Council
Certificate Number 0214.35
Valid to December 31, 2018

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