

Testing Capabilities of Advanced Materials Defence Testing Foundation (AMDTF), Lucknow

Testing Capabilities of the Facility

The proposed Defence Testing Infrastructure is designed to deliver comprehensive evaluation of materials, components, and assemblies required for Defence and Aerospace programs. The facility will bring together multiple disciplines under one roof to enable seamless qualification, failure analysis, and certification activities.

- **Mechanical & Material Testing:** The laboratory will be equipped to assess the mechanical behaviour of metallic and composite materials across static, dynamic, and environmental conditions. Capabilities include determination of strength, deformation, fatigue life, impact resistance, and behaviour under varied temperature regimes. Such evaluations will support qualification of structural components, propulsion systems, and mission-critical hardware used in aircraft, missiles, naval and land platforms.
- **Metallography & Fractography:** Dedicated metallurgical facilities will enable microstructural examination, fracture analysis, and assessment of manufacturing quality. These capabilities will support investigation of material integrity, heat-treatment effectiveness, weld quality, and root-cause analysis of failures, thereby assisting designers and production agencies in improving reliability.
- **Chemical Testing & Analysis:** The centre will host advanced analytical systems for precise determination of elemental composition and material characteristics. This will facilitate verification of raw materials, alloy chemistry, contamination assessment, and conformity to Defence specifications, which are essential for certification of high-performance components.
- **Non-Destructive Testing (NDT):** Comprehensive NDT capabilities will allow detection of surface and sub-surface defects without affecting component usability. Techniques such as ultrasonic, radiographic, magnetic particle, dye penetrant, and eddy current inspection will support in-process quality assurance as well as final acceptance of Defence hardware.
- **Calibration & Sample Preparation:** A dedicated calibration cell and sample preparation infrastructure will ensure traceability and repeatability of all measurements. Standardised preparation of specimens and calibrated instruments will provide confidence in test results and compliance with national and international standards.

Compliance with National & International Standards

The AMDTF facility will operate in full conformance with recognised Defence, national, and international standards to ensure universal acceptance of test results. The laboratory will implement quality systems in line with ISO/IEC 17025:2017, pursue NADCAP accreditation, and maintain certification to ISO 9001, establishing competence, traceability, and impartiality in all testing activities.

Testing and evaluation will be performed in accordance with Defence standards including JSS 55555, JSG 0102, DEF-133, DEF STAN 00-1, DEF STAN 07-55, MIL-STD-810, and IS:196 for controlled test atmosphere. Procedures will also align with CEMILAC requirements for airworthiness and acceptance of Defence hardware.

Domain-specific methods will follow globally accepted norms such as ASTM, ISO, EN, AMS, and ASME for mechanical testing, metallography, chemical analysis, and non-destructive evaluation. All equipment will be calibrated to national traceability standards, and documented quality processes will ensure repeatability, data integrity, and acceptance of reports by OEMs, DPSUs, and certification agencies.

Standards Coverage

- **Accreditations:** ISO/IEC 17025 • NADCAP • ISO 9001
- **Defence Standards:** JSS • JSG • DEF STAN • MIL-STD • CEMILAC
- **Mechanical:** ASTM A370, E8, E23, E10, E139, ISO 148, EN ISO 6892
- **Metallography:** ASTM E112, E45, ISO 4967, DIN EN ISO 643
- **NDT:** ASTM E709, E1417, EN 583, AMS 2630/31/32
- **Chemical:** ASTM E415, E1019, E1447, ASTM G48/A262.