



**Professional  
Testing Services**



Few industries demand more precision and care in their operations than the semiconductor, data storage, electronics manufacturing and pharmaceutical businesses. That is why a fast-growing number of major corporations in these fields have come to rely on Cesstech to help maintain their exacting standards.

Cesstech offers a complete range of auditing, qualification, testing & certification services. Our testing services encompass Cleanroom/ Minienvironment/ Clean Air devices performance testing and certification, ESD audits /surveys, evaluation and testing services and other customised contamination control testing. As a provider of microcontamination and ESD solutions for ultra clean environment and processes, our services also include designing of application specific testing protocol to diagnose, troubleshoot and then solve peculiar contamination and/or ESD problems.

In Cesstech, you will find a partner perfectly capable of meeting your stringent performance evaluation, measurement and qualification demands.



## HELPING COMPANIES MAKE THE GRADE

Cesstech is in the business of foolproofing systems. Our host of maintenance, testing and certification protocols and methods conform to recommended practices and the highest industry standards. Cesstech's clients are tested against internationally recognized standards such as ISO Cleanroom Standards (ISO 14644-X), IEST Recommended Practices for contamination control, the NEBB Procedural Standards for Certified Testing of Cleanrooms, SEMI / ASTM standards and ESD Association standards.

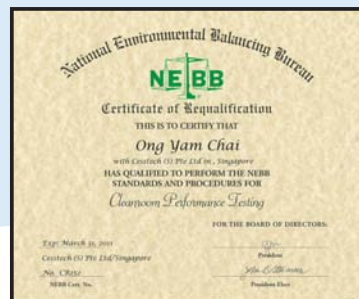
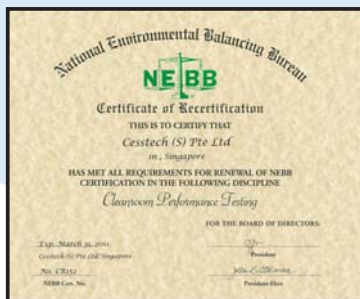
To make sure that we are kept abreast of industry requirements and protocol, all our key staff are members of IEST, EOS/ESD, NARTE and NEBB Associations and Organizations.

### Applications:

- Semiconductor
- Data Storage
- Flat Panel
- General Electronics
- Pharmaceutical
- Bio-Medical Sciences
- Hospitals
- Research Institutions
- Independent Labs
- Cleanroom Equipment Manufacturers
- Minienvironments/ Clean Air devices Materials' Manufacturers
- Cleanroom Builders
- ESD Safe Labs
- Front End semiconductor Tools
- Storage Tools
- Test Handlers
- Photolithography Equipment
- Cleanrooms
- Minienvironments
- Assembly Workstations
- Materials Manufacturers



Reg No: CR152



# Cleanroom and Contamination Control Testing

Cesstech offers a complete range of auditing, qualification and testing/ certification services. Being NEBB (National Environmental Balancing Bureau) certified, our credentials as an independent third party certifier are backed by a team of professionals that include NEBB qualified and certified Cleanroom Performance Testing (CPT) supervisors with a combined experience of more than 30 years in the testing and certification of cleanrooms, clean air devices and minienvironments.



## Benefits:

- Independent 3rd party assessment
- Development of test methodology/ acceptance criteria/ compliance verification plan
- Problem identification and solution provision
- Formal reports with recommendation
- Conformance to industry recognized standards and protocol
- Compliance to quality assurance guidelines within the facility
- Enables compilation of historical data and trend analysis over time

## Advantages:

- Experience in a diversity of industrial sectors
- Exemplary track record
- All testing and studies supervised by qualified NEBB certified cleanroom testing supervisors
- One stop shop for performance testing and contamination studies
- Detailed report with statistical analysis
- Comprehensive arsenal of equipment- both hardware and software
- Trained technicians and engineers with relevant experience



## Our services include :

### • Independent third party performance testing and certification

Includes the testing and certification of new, as-built cleanrooms, clean air devices and minienvironments according to user defined or standard test methodology. Testing is normally done according to internationally recognized standards and recommended practices such as the ISO cleanroom standards and the IEST recommended practices on contamination control.

### Some of the performance tests that we conduct include :

- Air Volume, Velocity & Uniformity Tests
  - Temperature/RH (General & Comprehensive) Test
  - Airflow Parallelism Test
  - Flooring Resistance Tests (RTG/PTP)
  - Vibration Test
  - Airborne Particle Count
  - Sound Pressure Level Test
  - Room Pressurization Test
  - Lighting Level Test
  - Air Visualization Study
  - HEPA/ULPA Installation Leak Test
    - Aerosol challenge/Photometer method
    - Aerosol particle challenge/Particle counter test method
  - Recovery Test
  - Room Integrity Test
  - Electrostatics / Air Ionizer Performance Tests
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- **Re-certification / Compliance verification**  
Includes the periodic testing and certification of operational cleanrooms, clean air devices or minienvironments to ensure compliance of critical parameters like airborne particle levels (cleanliness class), airflow velocity, pressurization and temperature / RH to established acceptance levels.
  - **Training**  
Training is available on Cleanroom / Minienvironment Performance Testing and Certification, ISO Cleanroom Standards and Application, Implementation of a Monitoring Plan for Periodic verification of Cleanrooms, Basics of Cleanroom testing for technicians and engineers . The training could be a half day affair or a full day seminar type affair with practical sessions.
  - **Monitoring Plan per ISO 14644-2**  
Involves an assessment of the cleanroom facilities and then coming up with a written monitoring plan based on guidelines in the ISO 14644-2 Cleanroom standard. The monitoring plan will cover the frequency of re-testing, the sampling plan, parameters to be monitored, acceptance limits , remedial action plan / contingencies, compliance verification plan and training requirements.
  - **Contamination control studies / surveys**  
Involves an objective assessment of the cleanroom or clean environment with regards to particle contamination. Includes performance of a series of tests and perhaps data collection via real time monitoring hardware / software and then proposing recommendations on how the contamination can be reduced and/or controlled. In some cases an air visualization study will be conducted to assess the airflow movement within the cleanroom.

- **Material compatibility to cleanliness classes**

Testing of materials like fans, motors, fan filter units, conveyor parts etc to ascertain their compatibility to a cleanroom environment with regards to particulation. This involves formulation of a detailed test plan based on test methodology, parameters to monitor, duration of monitoring and acceptance criteria. In most cases the conclusion is drawn based on a proper statistical analysis of the results obtained.

- **Long Term Particle Count Studies**

In some cleanrooms due to an intermittent trend of particle contamination, longer term studies need to be done to ascertain the sources of these contamination. Through the use of appropriately placed remote particle sensors and software, a study can be devised that monitors the particle trends at different locations within the cleanroom facility, over time and space. After a period of time, the sources of contamination can be detected, based on the trend and results obtained and then remedial action can be taken. In most cases such studies take anything between one week to a few months to complete.

- **Particle count measurements in utilities / facilities**

Entails the utilization of standard or modified particle counters to measure the airborne particle counts within compressed air piping, de-ionized water and speciality tools within clean air devices, according to recognized test methods and protocols.



## ESD Surveys, Audits and Testing

Cesstech's arsenal of equipment and expertise facilitates a wide-ranging battery of ESDC (Electrostatic Discharge Control) tests and measurements on everything from materials to tools within mini-environments to ensure that these are "ESD-safe". All the tests are supervised by NARTE (National Association of Radio and Telecommunications Engineers) qualified and certified ESD technicians / engineers.

### Benefits:

- Formal evaluation/ analysis of ESD environment
- Independent third party assessment by NARTE qualified individuals
- Formal reports with recommendations
- Development of test methodology/ acceptance criteria/ compliance verification plan
- Identification of ESD susceptibility & failures
- Provision of customized solutions
- Continuous update on standards/ plans
- Feedback & follow up action plan
- Customized training programs

### Our Services Include :

- **ESD/ ESC Audit**

Checking and verification of every aspect of in-house and factory wide ESDC programmes and ESD safe practices. The audit will include measurement of surface charge/ field potential/ triboelectrification and resistance measurements (amongst others) on tools, direct/ indirect materials, workstations, Electrostatic Protected Areas (EPAs), floors, ESD garments, mobile equipment, shelving and footwear amongst others.

- **Developing and Managing an ESD Control Program Plan**

Includes developing an ESD Control program plan based on ESD susceptibility of parts or products at different stages of the manufacturing process. The scope entails doing a pre-audit where baseline measurements are made, then formulating the actual ESD control program plan, implementing the program, establishing compliance verification frequency, methodology and training.



- **ESD Training**

Training is available on ESD Basics, Static Charge Control, Developing & Managing an ESD Control program, Theory/ Fundamentals/ Use of Ionization and In-field ESD Testing & Auditing for operators, technician and engineers. The training could be a half day affair or a full day seminar type affair with hands-on demonstrations with factory walk-through.

- **ESD Materials / Parts Testing**

Testing of materials or parts like flooring, reticle pods, wafer carriers, ionizers, mats, garments etc for independent qualification purposes is available in our ISO Class 6 (with ISO class 4 workstation) ESD safe facility or at site. Testing is done according to recognized ESDA standards and relevant data and summary will be submitted after the testing.

- **ESD Testing for Tools / Minienvironments**

Includes testing and verification of materials, work surfaces, transfer mechanisms, grounding, ionization and the general environment and enclosures. Tests include surface charge / field potential and triboelectrification tests, resistance measurements, grounding checks, quantifying number and magnitude of ESD events, electromagnetic field measurement and ionizer performance measurements, amongst others.

- **Implementing a ESD Compliance Verification Plan**

Includes developing a compliance verification plan to check and assess the ESD environment with regards to periodic tests and measurements. The plan will cover personnel, materials, production tools, storage and transfer mechanisms and components of a cleanroom environment, where applicable. The type of tests to be carried out, the test equipment to be used, the acceptance criteria and the frequency of testing will all be covered as part of the compliance verification plan.

- **Ionization**

Includes evaluation and recommendation of ionizers for different applications. Long term evaluation can also be undertaken with monitoring of defined parameters. The evaluation will include graphical plots of the offset voltages and decay times over time. Other parameters like particle count can also be monitored under a controlled cleanroom environment. The evaluation can also include the performance of the ionizers with feedback sensors/ controllers and with different types/ materials of emitter points.

- **Monitoring & Quantifying ESD events**

Includes using ESD event monitors and software to evaluate the environment under concern. By appropriate placement of the ESD event monitors, ESD events can be quickly picked up and assessed depending on the ESD susceptibility of the product and/or environment. Remedial action can then be recommended and implemented. Applicable to ESD-safe environments, tools and mini-environments . Can be implemented as part of a facility's ESD compliance verification plan as quantifiable data can be obtained on the performance and success of the adopted ESD control program through such measurements.

- **Semi E78 Compliance Testing**

In conjunction with our value added partners, the above compliance testing can be undertaken to assess the electrostatic discharge (ESD) and electrostatic attraction (ESA) environment within the semiconductor tools. A series of tests are undertaken to ascertain and determine the sensitivity level of the tool, based on the static charge levels measured (Level 1 to Level 4, measured in both  $\eta$ C and volts/cm)

## CHALK UP A CLEAN RECORD WITH CESSTECH

Far from remaining static, international cleanroom and ESD standards are constantly being improved on. At Cesstech, we maintain a rich database that helps us stay abreast of such changes and so provide our clients with the competitive edge in these aspects of their operations.

Indeed, keeping our clients fully in the loop is a crucial part of our modus operandi. Our professionalism comes through most visibly in the presentation of test results. In addition to a detailed report with analysis of the findings made, we also forward meticulous documentation to ensure that data can be easily extracted and diagnosed statistically.

Take the first step in joining an impressive list of major corporations that retain our services to maintain their own high standards of performance. Call Cesstech and find out how we can be an invaluable partner in bringing out the best in your business.



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ISO 9001:2000

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REVISION 1 - 10/2008

Microcontamination and ESD Solutions for Ultra Clean Environments and Processes