

**Approval Criteria**  
**for**  
**Information Technology Testing Laboratory**

-Software Applications and Systems for E-governance Solutions

Doc. No.: **STQC-AS-ITTL-03**, Version: **1.0**, Rev: **01**



**Standardization, Testing & Quality Certification**

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**New Delhi-110003**



**Approval Scheme for  
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## 1. Scope of Document

- 1.1 The general criteria for laboratory approval are laid down in the international standard General Requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017) and IT Testing Laboratories seeking approval must meet all of these requirements.
- 1.2 This document describes specific requirements that an IT testing laboratory has to meet, in addition to the requirements of ISO/IEC 17025: 2017.
- 1.3 This criteria document provides extra information and interpretation of ISO/IEC 17025:2017 requirements and other aspects of laboratory management practices which are considered to be minimum standards for IT testing laboratories being approved against STQC Approval Scheme.
- 1.4 As majority of IT testing laboratories are primarily involved in testing software applications and systems under three main disciplines:
- Software conformance Testing
  - System conformance Testing
  - Network Testing

This document has tried to provide a better insight in the understanding of ISO/IEC 17025:2017 requirements as applicable to IT Testing Laboratory.

- 1.5 For the purpose of covering the activities pertaining to grant of approval, a group wise list of IT tests for which STQC Approval Body offers approval may be sought for different type of testing given below under the heading of IT Disciplines given in 1.4 above.

Sr. No.	Type of Testing
1.	Functional Testing
2.	Performance Testing
3.	Application Security Testing
4.	Usability Testing
5.	Code review
6.	Network Security Testing
7.	Vulnerability Analysis & Penetration Testing
8.	Portability Testing
9.	Interoperability testing
10.	Accessibility testing
11.	Configuration & Compatibility Testing
12.	Website Testing

- 1.6 The definitions of terms used in IT testing is given in Annexure – I.

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## 2. Criteria for Approval

All laboratories seeking certificate of approval for Information Technology Testing must comply with the ISO/IEC 17025: 2017 General requirements for the competence of Testing and Calibration Laboratories. In addition the Testing Laboratories shall also comply with the following supplementary requirements which specifically elaborate the interpretations of ISO/IEC 17025 requirements as applicable to information technology. Compliance to both ISO/IEC 17025 & Supplementary requirements is mandatory to demonstrate the capability & competence of IT Testing Laboratory engaged in testing of e-governance solutions.

This approval criterion is applicable to all IT testing labs irrespective of size, scope of testing and number of personnel.

### 2.1. Supplementary Requirements:

Additional supplementary requirements as applicable IT Testing Laboratory with reference to Clauses of ISO/IEC 17025:2017 standard requirements are given below:

### 3. Terms and Definitions: Refer Annexure-I and ISO/IEC 17025:2017 standard.

## 4. General Requirements

### 4.1 Impartiality:

- a) The laboratory shall clearly define the responsibilities to avoid conflict of interest when the laboratory staff is holding additional responsibilities such as design, development, implementation, operation, maintenance etc. other than testing.
- b) When the test scripts and tools are developed as part of the software development process, the laboratory shall have procedures for ensuring its independence and that of its staff from the development process and shall validate its suitability before use to avoid any potential conflict of interest.

### 4.2 Confidentiality:

Operational production data containing personally identifiable information or any other confidential information shall be avoided for the purpose of carrying out testing. If personally identifiable information or otherwise confidential information is used as test data, all sensitive details and content are used, it shall be justifiable, masked and protected either by removal or modification.

Refer ISO/IEC 27002: 2013 for guidelines provided under protection of test data (CI no14.3).

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**5. Structural Requirements:**

5.1 Laboratory shall provide one of the following documents in support of its legal status claimed:

1. Proprietorship firm (Bank passbook, Account statement, ID of the proprietor)
2. Partnership firm (Copy of registration under 1932 Act)
3. Company Act (Copy of registration under 1956 Act)
4. Society Registration Act (Copy of registration under 1860 Act)
5. Indian Trust Registration Act (Copy of registration under 1882 Act)
6. Limited Liability Partnership (Limited Liability Partnership Act, 2008)
7. Government (Copy of Government Notification / Declaration etc.)

5.2 **Permanent Laboratory:** Laboratory set up at a dedicated location for an indeterminate amount of time. (Location / Address denoted on certificate of Approval.)

**Entity:** Company, Consultancy, Partnership, other body without permanent laboratory who perform testing at site.

**Site Testing:** Testing performed by the personnel of Laboratory or Entity at customers premises or location outside of permanent laboratory.

- (i) Temporary facility created for a defined period is considered as site testing facility
- (ii) Site Tests are:
  - a. by an accredited, permanent laboratory
  - b. by an entity that does not have a permanent laboratory

5.3 The organization and management structure of the laboratory can be in various forms i.e. individual laboratory at single location, laboratory being part of larger organization, laboratory with multiple locations, laboratory in Public Private Partnership (PPP) mode etc. For Public Private Partnership (PPP), accountability of test reports issued, shall lie with the laboratory as per the contractual agreement, albeit, such agreement shall be devised on long term basis (Minimum 02 years).

5.4 The designated personnel (howsoever named), responsible for implementation, maintenance and improvement of the management system of laboratory, shall have competency in insuring effectiveness of ISO/IEC 17025 Or any other equivalent training on ISO/IEC 17025.

5.5 Laboratory personnel trained on previous edition of ISO/IEC 17025 are required to be familiar with requirements of new edition i.e. ISO/IEC 17025: 2017. The competence shall be verified by assessment team.

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### 6. Resource Requirements:

**6.1 General:** No supplementary requirements

#### 6.2 Personnel:

6.2.1 Educational qualification for personnel performing software testing given below:

<b>Designation</b>	<b>Job Profile</b>	<b>Academic qualification</b>	<b>Experience in years</b>
Test Engineer	Developing test design specifications, test cases, test suits etc.	B Tech, B E, MCA or equivalent Diploma in IT/CSc/ Electronics /Communication	- min. 2 years;
Test Lead/ Test Manager	Developing Test Plan, Test Methods, review of test design specifications, test cases, test suits etc.	B Tech, B E, MCA or equivalent, Diploma in IT/CSc/ Electronics /Communication CSTM/ISTQB certification or equivalent is desirable;	min. 2 years min. 5 years;
Technical Manager	Overall Responsibility of Technical operations	B Tech, B E, MCA or equivalent, Diploma in IT/CSc/ Electronics /Communication; CSTM/ISTQB certification or equivalent is desirable,	min. 5 years min. 10 years
Quality Manager (Designated)	Overall Responsibility of QMS activities of laboratory	B Tech, B E, MCA or equivalent, Diploma in IT/CSc/ Electronics /Communication	min. 5 years min. 10 years

**Note:** In case the above functions are carried out by contract personnel,

1. The contract shall address:
  - Responsibilities and authorities
  - Confidentiality, integrity & indemnity requirements.
2. The laboratory is responsible for ensuring required qualification, experience, training, up gradation of the technology and domain related knowledge etc.

6.2.2 The laboratory shall have the training procedure covering:

- Laboratory Management System
- Test project specific domain/technology
- Operation of Test tool
- Operation of hardware and software at-site

6.2.3 The laboratory shall identify personnel for report preparation, review and authorisation to release the test report.

The laboratory shall document the minimum competence requirement for each function such test manager/ Test Lead/ Tester/ Evaluator/Lead evaluator etc and shall have Knowledge of:

- STQC Approval criteria
- Planning & designing of tests, analysis & reporting of test results
- standards or specification, Test Methods & techniques
- the laboratory quality system;

The laboratory personnel shall have qualification of Bachelor/Master degree in Engineering, MCA

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or MSc in Computer Science/IT/Electronics with 5 year relevant experience or Diploma in IT/CSc/ Electronics /Communication with min. 10 years; CSTM/ISTQB certification or equivalent is desirable.

### 6.3 Facilities and Environmental Conditions:

6.3.1 For software testing, the term “environment” includes the hardware and associated software on which the software being tested is running.

6.3.2 Software Testing service may be carried out only in the appropriate test environment that may be created & accessed by following means-

- i. **Permanent/ in house testing service:** Test is executed by creating test environment within the laboratory.
- ii. **On site Testing:** Test is executed on site location i.e. away from permanent site, by creating test environment accessing IT system infrastructure at customer location or IT infrastructure at Data centres.
- iii. **Accessing ‘on site testing facility’ at permanent laboratory:** Test is executed at permanent laboratory by remotely accessing Test environment that is created either at ‘on site customer location’ or Data centres or on cloud using IAAS/PAAS services.

In each of the above cases, the laboratory shall maintain and record the configuration of test environment set up throughout the testing process. Measures to control shall be defined and implemented wherever required.

6.3.2 If testing is to be performed using equipment or tool or system controlled by the customer, developer or user, procedures for the extent of control on these items shall also be recorded.

6.3.3 In case of In-house testing, where the testing is required to be performed using IT infrastructure or tools

or system controlled by the customer/ developer, procedures for the extent of control on these items shall be defined and recorded.

6.3.4 Testing shall be performed in a realistic/ similar to production/ target environment relevant to the test parameter and context of use. Deviation, if any, shall be justifiable and the risks due to test environment related specific failures shall be recorded.

6.3.5 Testing should be conducted in an environment segregated from both the production and development environment.

6.3.6 There should be no other concurrent activities or interference from other activities occurring during

testing that may affect or invalidate the results.

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6.3.7 Where any virtual environment or other special configuration (creating virtual users, setting network bandwidth etc in case of performance/ load testing) is created for simulating real life production conditions, it shall be fully documented in the test records along with a justification as to why it is believed not to affect or invalidate the results.

6.3.8 Access control to laboratory areas, server room, Data centre and designated test areas (e.g. Usability Laboratory, Common Criteria laboratory etc) shall be restricted to ensure the integrity of SUTs, test environment and test artefacts.

### 6.4 Equipment:

6.4.1 The Standards which define the software product requirements and its evaluations, requirements for test documentations, design methods for test cases and any other standard methods are considered as test methodologies.

6.4.1.1 The testing methodology to be followed at various phases of testing shall be documented as indicated below:

Sr. No.	Test Methodology	Test Artefact	Requirements*
1	Test planning & Control	Test Plan	Scope, Risks, Objectives, strategy & approach, Test schedule, Resource Requirements, Roles/Responsibilities etc.
2	Test Analysis & Design	Test design specification	Test requirement specifications, scenario selection, data input selection, Test method selection, Test coverage and traceability to requirements.
3	Test implementation	Test Case Design	Testing procedures, Test cases, test suite, scripts generations etc.
4	Test Execution	Test Result	Test Logs, Anomaly classification
5	Test Reporting	Test Report	Anomaly Report, Test Summary Report
6	Test Closure	Exit Criteria	Test Closure Report

\* Separate Test procedures/methods need not rewritten where ever national/international standards are referred.

6.4.1.2. The Laboratory documented procedure shall also address the following:

- a. Assurance that test case results are not ambiguous and have single thread of execution with objective results relating to expected outcomes.
- b. Assurance that any automated test suites will produce valid results.
- c. Test anomaly characterization and priority.
- d. Review & approval of every test artefact.
- e. Criteria for running partial testing or re-testing and regression testing.
- f. Test artefact configuration management.

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- 6.4.1.3. Laboratories testing as per standard methods shall document of all interpretive decisions for any ambiguity in the standard test methods or specifications.
- 6.4.2 Validation of test methodology: The test suites/plans/specifications/cases shall be technically reviewed and approved prior to execution. This review shall include:
- (a) Confirmation of adequate test coverage of all requirements.
  - (b) Confirmation that test case results are not ambiguous and have objective pass/fail criteria.
  - (c) Confirmation that any automated test suites will produce valid results.
- 6.4.3 Hardware, software and Software test tools significant to testing are considered as equipment. Inventory to be maintained for IT infrastructure with the current versions of the Hardware, Software, Tools etc.for the applied scope. The laboratory shall have access to Hardware, software and Software test tools and same shall be brought under configuration management.
- When tests are performed using equipment or systems controlled by the customer, developer or user, the laboratory shall have the procedure to ensure the integrity, validation and extent of control of these equipment. The extent of control includes but not limited to the following:
- Ownership at the time of use of equipment ( licensing detail/pattern)
  - Permission rights and user roles
  - Protection of Software test tool configurations
  - Configurations and adaptations to test environment
  - Control of test data (Software test tools should be reset or logs emptied between tests to ensure that only current test data is recorded)
  - Control of Automated test suite
- 6.4.4 Software Tool validation confirms that the software tools meet the specified requirements. The software tools shall be validated, documented and include the following objective evidence:
- (a) Laboratory developed /customer developed/ open source testing tools – Validation is required
  - (b) COTS software tools– Acceptance testing for each installed instance.
  - (c) MOTS software tools – Acceptance testing for each installed instance along with validation of the modification or tailoring.
- 6.4.5 A ‘reference implementation’ shall be used for test tool validation. If there is no Suitable ‘reference implementation’, then the laboratory shall have the procedures to verify the correct operation of the test tool. The laboratory shall maintain the records and shall include the following:
- Test cases being run, date, environmental information
  - Summary of the results obtained
  - Details of any discrepancies from the expected results
  - Results of Comparison with similar such tools
- 6.4.6 Each software test tool installation (instance) shall undergo a documented installation/operational qualification prior to use. There shall be documented evidence of the configuration and inventory of each specific installed software or system and suitable tests to confirm functionality.

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6.4.7 In case Software test tools are installed on more than one systems, each instance of test tool software shall be uniquely identified on each target environment and be under configuration management.

6.4.8 All equipment including test tools shall be identified and brought under configuration management.

6.4.9 The laboratory shall maintain records of equipment and shall at least address the following:

- (a) Identity – each instance of software/hardware.
- (b) Manufacturer –manufacturer name, and version number.
- (c) Checks - installation/operational qualifications
- (d) Location – target system name or location.
- (e) Manufacturer instructions – user manuals.
- (f) Validation details
- (g) Up gradation and renewal of license

## 6.5 Metrological Traceability:

Metrological Traceability is not applicable for software testing, but risk due to false accept, false reject and assumption to be identified, analysed and eliminated or mitigated. The test tools including open source tools used by the lab are being validated and the evidences in support of that need to be maintained

## 6.6 Externally Provided Products and Services:

6.6.1 Sub-contracting of Tests and Calibration:

A competent sub-contractor laboratory shall be STQC approved IT Testing Laboratory or have the approval by National approval body which are Mutual Recognitions arrangement (MRA) partners.

The approval/approval status of subcontractors shall be regularly reviewed to ensure validity.

6.6.2 Externally provided products and services in software testing includes:

**a Products:**

- Commercially available software testing tools/ test suites, Configuration Management tools, Test Management Tools, Defect management tools, etc
- IT infrastructure such as Servers, Storage devices, Client machines, Network components, etc
- System software and Middleware

**b Services:**

- i. Testing tools, IAAS, PAAS services etc on cloud
- ii. Internet/leased line connectivity services
- iii. Hardware and software/tool maintenance/ up gradation services

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- iv. Network maintenance services
- v. Maintenance of UPS, air conditioners etc.

**6.6.3** While availing services such as Cloud services, Internet services, maintenance services, laboratory shall establish requirements in terms of Service level agreement and monitor the performance whether desired level of service is delivered.  
effects testing quality

## 7. Process Requirements

### 7.1 Review of requests, tenders and contracts :

- 7.1.1 The contract shall adequately address Test Environment related issues clearly specifying the Hardware, Software & middleware platforms including those components supplied by the Client. The test environment boundary interface points shall also be clearly defined
- 7.1.2 The contract shall define and reviewed for acceptance of Test methodology as covered in 6.4.2.

### 7.2 Selection, verification and validation of methods : Refer Clause No. 6.4

### 7.3 Sampling:

In context of software testing, the laboratory shall have procedure for sampling covering the following depending on the test requirements:

- selection of test cases to test different conditions and combination of variables
- selection of regression tests to rerun
- selection of source code to review based on risk

Laboratory shall detail sampling requirements in the Test plan and maintain records.

### 7.4 Handling of Test and Calibration Items:

Laboratories shall maintain SUT under configuration management with appropriate metadata to ensure it is unique. The original supplied test item shall be controlled and made available for verification if any intended or unintended modifications occur during installations to the SUTs.

When any suitability or compatibility problems occur during integration of SUT with supporting software, the laboratory shall record the same and customer accordingly intimated for further instructions before proceeding.

### 7.5 Technical Records:

Technical records shall also include the correct and complete identification of the test environment consisting of deployment diagram as appropriate, list of hardware and software used for all system components along with configuration details.

In case of at-site testing the following control of technical records shall be ensured:

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- a. Security and Integrity of test records
- b. Test Environment configuration used during testing
- c. Backup of Test records
- d. Access control to Test artefacts
- e. Review & approval of Test artefacts (Test Plan, Test case, Test Results)
- f. Authority for removal of test records at site after completion of work.
- g. Audit trail to establish traceability and any modifications to test artefacts.
- h. Methodology to transfer test artefacts to permanent facility & its retention.

**7.6 Evaluation of measurement uncertainty:** The evaluation of Measurement Uncertainty (MU) is not applicable as IT testing executes digital logic on a pass/fail basis.

## **7.7 Assuring the Quality of Test and Calibration Result:**

The laboratory shall document quality assurance/control monitoring activities during the software test life cycle. The monitoring activities may include review of test activities such as test planning, test analysis & design, test implementation & execution, test reporting etc. for testing at centre and at test site.

## **7.8 Reporting the Results:**

When testing requirements includes multiple test types (Functionality test, performance test, security test etc.) the laboratory shall document policy on issue of full or partial reports for each test type and issued test reports shall be interrelated.

The anomalies listed in the test report shall include severity descriptions for every anomaly.

Any suggestions of workarounds on resolution of anomalies shall be treated as opinions.

**7.9 Complaints:** No supplementary requirements

**7.10 Control of Non-conforming Testing work:** No supplementary requirements

**7.11 Control of Data and information Management:** No supplementary requirements

## **8. Management system requirements**

**8.1 Options :** No additional requirements

**8.2 Management system documentation :**No additional requirements

### **8.3 Control of Management system documents:**

Test artefacts which includes test plan, test suite, test cases including relevant input data, test procedures and test design specification shall be controlled, reviewed, approved and revised as required by clauses 4.3 and 5.4 of ISO/IEC 17025.

Where Test Management Tools are used for controlling & tracking of test artefacts, procedure shall address appropriate implementation of management and control configuration, maintenance of traceability between related documents and defect tracking.

**8.4 Control of Records(Option A) :** No supplementary requirements

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**8.5 Actions to address risk and opportunities (Option A) :**

The laboratory to plan and implement actions to address risk and opportunities. This approach will be vital tool to enhance the effectiveness of the management system, achieving improved results and preventing the adverse effects. Here laboratory has to determine which risk and opportunities are to be addressed.

Risk arising out due to following but not limited, shall be determined and mitigated where necessary.

- 1) Risk due to Impartiality.
- 2) Risk due to false accept, false reject and assumptions.
- 3) Risk due to halting of work, repeating of work or with holding the test report.
- 4) Risk due to corrective action.

Risk assessment shall be reviewed at least once in a year for its effectiveness.

**8.6 Improvements:** No supplementary requirements

**8.7 Corrective actions:** No supplementary requirements

**8.8 Internal Audit**

The internal audit schedule should ideally cover all elements of the Quality System over a 12 months period. And shall be carried out once in a year.

The laboratories procedures for at-site testing must be described in the laboratory's quality system documentation and be subject to the internal auditing process.

**8.9 Management reviews**

The effectiveness of the Quality System shall be reviewed by Management at least once in a year.

The laboratories procedures for at-site testing must be described in the laboratory's quality system documentation and be subject to the review process.

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**Annexure-I  
Definitions**

**Acceptance Testing:**

Formal testing conducted to determine whether or Not system satisfies acceptance criteria and to enable the customer to determine whether to accept the system [IEEE STD 610-12:1990].

**Configuration management:**

A discipline applying technical and administrative direction and surveillance to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, record and report change processing and implementation status and verify compliance with specified requirements.

**COTS (Commercial Off The Shelf) Software:**

Code that is purchased without modification and either cannot or will not be modified by the lab. An example of this would be Microsoft Word/Excel/or dedicated instrument interface.

**Criticality or Severity:**

The degree of impact that a requirement, module, fault, error, failure, or other item has on the development or operation of system

**Error or Fault:**

The difference between a computed, observed, or measured valued or condition and the true, specified, or theoretically correct value condition.

**MOTS (Modified Off The Shelf) Software:**

COTS software that is configured or adapted to a specific application. Examples include Lab Windows, Lab Tech Notebook, Tile EMC, generic data acquisition software, excel formulas, or MS Office macros, etc.

**Product:**

e-Governance systems/applications/solutions

**Requester Requirements:**

An initial version of the evaluation requirements provided by the evaluation requesters.

**Reference Implementation:**

An implementation of one or more standards or specifications, against which a means of testing and test tools for those standards or specifications are tested, for the purposes of validation of those means of testing and test tools. The term validated reference implementation is used if the reference implementation has been shown to be derived faithfully from (i.e, to be 'traceable' back to) the relevant standard or specification.

**Software Developer:**

An organization that performs development activities during the software life cycle process.

**Software Test life cycle(STLC)** defines the steps/stages/phases in testing of software like Requirements/Design Review, Test Planning, Test Designing, Test Environment Setup, Test Execution & Test Reporting.

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**SUT (System Under Test):**

The software product or system undergoing testing by the laboratory

**System:**

A computing environment that contains both hardware and software, a collection of components organized to accomplish a specific function or set of functions

**Test Artefact:**

Phase	Activity	Deliverables / Test Artefacts
Requirements/ Design Review	You review the software requirements/design (Well, if they exist.)	Review Defect Reports
Test Planning	Once you have gathered a general idea of what needs to be tested, you 'plan' for the tests.	Test Plan Test Estimation Test Schedule
Test Designing	You design/detail your tests on the basis of detailed requirements/design of the software (sometimes, on the basis of your imagination).	Test Cases / Test Scripts /Test Data Requirements/ Traceability Matrix
Test Environment Setup	You setup the test environment (server/client/network, etc.) with the goal of replicating the end-users' environment.	Test Environment
Test Execution	You execute your Test Cases/Scripts in the Test Environment to see whether they pass.	Test Results (Incremental) Defect Reports
Test Reporting	You prepare various reports for various stakeholders.	Test Results (Final) Test/Defect Metrics Test Closure Report

Note: above table is referred from softwarefundamentals.com

**Test Requirements:**

Description of the objectives of the testing, generally relating to the products intended use and associates risks

**Test specification:**

Description of the scope of the Testing and the measurement to be performed on the product submitted for Testing and its various components. It details the test inputs, execution Conditions, and predicts results for an item to be tested.

**Test Environment:**

An operating environment that emulates, as close as possible, the target environment of the SUT. The test environment includes hardware, operating system, and any other software products running on the same machine.

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**Test Plan:**

A document that describes the technical and management approach to be followed for testing a system or component. It details description of Test actions required and resources needed to perform specified evaluation as well as the distribution of these resources across these action.

**Test Method:**

Specified Technical procedures for performing a testing service including:

- The specification of all the individual test cases of a test suite
- The test tools (both hardware and software) used to run those test cases and the way in which those test tools are used:
- The procedures used to select and run the test cases;
- The procedures used to analyse the observation and state the result

**Test Case:**

A set of inputs, execution precondition and expected outcomes develop for a particular objective such as to exercise a particular programme path or to verify compliance with a specific requirement.

**Test Software:**

Software used in order to carry out or assist in carrying out the testing required.

**Test suite:**

A complete set of test cases that is necessary to achieve some testing objective.  
Ex.: A collection of test cases to be executed as a logical group.

**Test Tool:**

Software or hardware products that are used to facilitate the testing of SUT

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