

NIST HANDBOOK 150-24
2009 Edition (DRAFT)

National
Voluntary
Laboratory
Accreditation
Program

PERSONAL
BODY
ARMOR

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Foreword

The NIST Handbook 150 publication series sets forth the procedures, requirements, and guidance for the accreditation of testing and calibration laboratories by the National Voluntary Laboratory Accreditation Program (NVLAP). The series is comprised of the following publications:

- NIST Handbook 150, *NVLAP Procedures and General Requirements*, which contains the general procedures and requirements under which NVLAP operates as an unbiased third-party accreditation body;
- NIST Handbook 150-xx program-specific handbooks, which supplement NIST Handbook 150 by providing additional requirements, guidance, and interpretive information applicable to specific NVLAP laboratory accreditation programs (LAPs).

The program-specific handbooks are not stand-alone documents, but rather are companion documents to NIST Handbook 150. They tailor the general criteria found in NIST Handbook 150 to the specific tests, calibrations, or types of tests or calibrations covered by a LAP.

NIST Handbook 150-24, *NVLAP Personal Body Armor*, presents the technical requirements and guidance for the accreditation of laboratories under the NVLAP Law Enforcement Equipment LAP.

The handbook was written with the participation of technical experts in the field of personal body armor and was approved by NVLAP.

This handbook is also available on the NVLAP web site <<http://www.nist.gov/nvlap>>.

Questions or comments concerning this handbook should be submitted to NVLAP, National Institute of Standards and Technology, 100 Bureau Drive, Stop 2140, Gaithersburg, MD, 20899-2140; phone: 301-975-4016; fax: 301-926-2884; e-mail: nvlap@nist.gov.

Introduction

In 2006, the U. S. Department of Justice (DOJ) National Institute of Justice (NIJ) Office of Science and Technology requested the establishment of a NVLAP program to accredit laboratories that test ballistic- and stab-resistant personal body armor to support the voluntary minimum performance standards developed for NIJ by the National Institute of Standards and Technology (NIST) Office of Law Enforcement Standards (OLES).

The National Institute of Justice is the research, development, and evaluation agency of the U.S. Department of Justice and is dedicated to researching crime control and justice issues. NIJ provides objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the state and local levels. NIJ's principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (see 42 USC § 3721-3723), and Title II of the Homeland Security Act of 2002. NIJ develops standards and test methods for law enforcement and corrections equipment, including body armor, and operates the NIJ Voluntary Compliance Testing Program (CTP). NIJ's testing program exists to ensure that law enforcement and corrections officers have the best information available about the performance and safety of equipment tested by the CTP, and participation by applicants in this program is voluntary.

While NVLAP may accredit any laboratory that meets NVLAP administrative and technical requirements, the DOJ has additional requirements. These requirements include: all laboratories performing compliance testing services for the Compliance Testing Program in accordance with NIJ Standards must be independent third-party laboratories which are located and which perform all testing within the United States. Additionally, all laboratories must be free of and demonstrate their freedom from any actual or potential conflicts of interest with respect to other services they and/or their parent organizations, subsidiaries and affiliates may provide, particularly regarding services pertaining to consultation on the design and manufacturer of the types of products for which the laboratory will perform NIJ compliance testing services.

Additional information about the Compliance Testing Program can be found at <www.justnet.org> or by telephone: 800-248-2742.

1 General information

1.1 Scope

1.1.1 The purpose of this handbook is to set out procedures, technical requirements, and guidance for accreditation of Personal Body Armor Testing Laboratories.

1.1.2 This handbook supplements the procedures and general requirements found in NIST Handbook 150. The scope of the Personal Body Armor Testing program is the set of tests contained in National Institute of Justice Standards 0101.04, 0101.06, 0115.00, and other appropriate standards requested by the Department of Justice.

1.1.3 The interpretive comments and additional requirements contained in this handbook make the general NVLAP criteria specifically applicable to the Personal Body Armor Testing laboratory accreditation program.

1.1.4 The requirements of NIST Handbook 150, this handbook, and the NIST Handbook 150-24 Checklists are normative (i.e., mandatory) and must be combined to produce the criteria for accreditation in the Personal Body Armor Testing program.

1.1.5 When testing under the compliance testing program, the laboratory shall meet all CTP requirements.

1.2 Organization of handbook

The numbering and titles for first and most second level headings of this handbook match those of NIST Handbook 150. Lower level headings are generally specific to the Personal Body Armor Testing LAP. In some cases, upper level headings have been included in the document with no additional text. In these cases, refer to NIST Handbook 150.

1.3 Program description

1.3.1 The purpose of the Personal Body Armor LAP is to accredit laboratories to conduct testing of personal body armor, providing a measure of confidence that such laboratories are competent to perform testing to meet the requirements of the Department of Justice.

1.3.2 Laboratories that achieve NVLAP accreditation and that meet NIJ administrative requirements are eligible for approval by NIJ. The CTP maintains the list of NIJ-approved laboratories to help vendors and purchasing authorities identify resources.

1.3.3 NIJ-designated laboratories test and NIJ certifies body armor for conformance with the DOJ standards. Test results are reviewed by the CTP to determine whether the body armor is eligible to be listed on the NIJ Compliant Products List.

1.4 References

The following documents are referenced in this handbook. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) shall apply within one year of publication or within another time limit specified by regulations or other requirement documents.

- NIST Handbook 150, *NVLAP Procedures and General Requirements*, 2006
- NIJ Standard-0101.06, *Ballistic Resistance of Body Armor*, July 2008, or latest version
- NIJ Standard-0101.04, *Ballistic Resistance of Personal Body Armor*, June 2001 Revision A
- NIJ Standard-0115.00, *Stab Resistance of Personal Body Armor*, September 2000, or latest version
- *National Institute of Justice Body Armor Compliance Testing Program - Body Armor Applicant Package*, NIJ BA CTP Applicant Package: 005
- *National Institute of Justice Body Armor Compliance Testing Program - Ballistics Test Laboratory - Application Package*, NIJ BA CTP Lab Application: 006
- *Compliance Test Report*, latest version of spreadsheet for NIJ 0101.06 testing
- *Compliance Testing Program Administrative Clarification series*

1.5 Terms and definitions

For the purposes of this handbook, the terms and definitions given in this handbook, NIST Handbook 150 and the definitions contained in relevant NIJ standards apply.

1.5.1 active

The compliance status of an armor model for which all CTP requirements have been met, for which a Notice of Compliance Letter is issued by the NIJ, and which is currently listed on the NIJ Compliant Products List.

1.5.2 Attestation of Conformity

The issuance of a statement, based on a decision following review, that fulfillment of specified requirements has been demonstrated. For the CTP, this statement is in the form of the issuance of an NIJ Notice of Compliance and inclusion on the publicly-accessible NIJ Compliant Products List.

1.5.3 Body Armor Applicant

The entity that submits an application for participation in the CTP and submits body armor test samples for compliance testing.

1.5.4 build sheet

The specification sheet for a body armor model, which fully describes construction and design features of the armor model. The build sheet template is provided by the CTP and must be adhered to by body armor applicants. The build sheet remains on file as the official documentation for design and construction of the body armor model that is listed on the NIJ Compliant Products List.

1.5.5

Compliance Decision

The determination of an armor model's compliance status based on evaluation of the Compliance Test Report (CTR) data, examination of submitted body armor test samples and build sheets, and agreement by the applicant to participate in the conformity assessment follow-up process.

1.5.6

Compliance Decision Body

NIJ makes all decisions related to an equipment model's listing on the NIJ Compliant Products List.

1.5.7

compliance expiration

60 months from the date on which the NIJ Notice of Compliance is issued for a specific armor model and that model is listed on the NIJ Compliant Products List. At the time of compliance expiration, the applicant may request that compliance be renewed for another five-year period.

1.5.8

Compliance Testing Program (CTP)

The program which controls all activities related to the implementation of NIJ standards for personal body armor that demonstrate commercially available armor meets minimum performance requirements.

1.5.9

Compliance Test Report (CTR)

A report of data and information resulting from type testing sent directly to the CTP by an NIJ-approved test laboratory. The CTR has a prescribed format, with prescribed data definitions, and is sent to the CTP using a set of spreadsheets provided by the CTP.

1.5.10

Compliant Products List (CPL)

A publicly-accessible listing of armor models that have been issued an NIJ Notice of Compliance indicating that the models have successfully met all requirements of the appropriate standard and the CTP.

1.5.11

Conformity Assessment Follow-up

A process that is intended to provide confidence that ongoing production of listed body armor models continues to meet requirements in accordance with the appropriate standard and CTP requirements.

1.5.12

CTP Administrative Clarifications

Formal clarifications of CTP administrative and testing requirements.

1.5.13

design discrepancy

The condition in which armor construction does not match the CTP-filed build sheet.

1.5.14 inactive

The compliance status of an NIJ listed armor model when one or more of the required conditions for compliance has lapsed. Inactive models are removed from the NIJ Compliant Products List. The following conditions lead to an armor model being determined to be inactive:

- Armor models that were tested to versions of NIJ standard that have been superseded by a subsequent revision and/or for which NIJ no longer publishes a list of approved body armor models are considered inactive.
- If the applicant is no longer in business or does not have current contact information on file with the CTP, the armor model is considered inactive.
- Armor models for which some administrative requirement of compliance status has lapsed (e.g., non-payment of fees, expiration of compliance status) are considered inactive.

1.5.15 inconsistent construction

The condition in which the CTP-filed armor build sheet, a submitted build sheet, and actual armor construction are different from each other.

1.5.16 Inspection Body

An entity contracted by the CTP to conduct conformity assessment follow-up activities as described by the CTP, including selection of production armor items for testing.

1.5.17 Listed Company

The entity listed on the NIJ Compliant Products List associated with specific listed armor models..

1.5.18 listing cycle

The 60-month time period between initial listing on the NIJ Compliant Products List and compliance status expiration.

1.5.19 Manufacturer

The name and physical location(s) of the body armor manufacturing facility.

1.5.20

Model Designation: A unique identifier assigned by the body armor applicant to an armor model that has received an NIJ Notice of Compliance and by which that armor model is identified on the NIJ Compliant Products List.

1.5.21 NIJ-approved Test Laboratory

A ballistics test laboratory authorized by NIJ to conduct testing in accordance with the standard and CTP program requirements.

1.5.22 non-compliant

The status of an armor model when testing or evaluation demonstrates that an armor model does not satisfy one or more of the CTP requirements. A non-compliant armor model is not listed on the NIJ Compliant Products List.

1.5.23

Periodic Test Report (PTR)

A report of data and information resulting from periodic conformity assessment follow-up testing sent directly to the CTP by an NIJ-approved test laboratory. The PTR has a prescribed format, with prescribed data definitions, and is sent to the CTP using a set of spreadsheets provided by the CTP.

1.5.24

revoked

The compliance status of an NIJ listed armor model when one or more of the required conditions for compliance fails to be met either intentionally or unintentionally due to an action on the part of the body armor applicant. Revoked models are permanently removed from the NIJ Compliant Products List.

1.5.25

Statement of Compliance

A statement to be placed on a body armor model for which NIJ has issued a Notice of Compliance, and the statement shall read:

“This model of armor has been determined to comply with NIJ Standard-0101.06 by the NIJ Compliance Testing Program and is listed on the NIJ Compliant Products List.”

1.5.26

Stop Point

A CTP-defined step during type testing at which the test may be stopped or interrupted by the test laboratory at the direction of the body armor applicant.

1.5.27

suspended

The temporary compliance status of an NIJ listed armor model when one or more of the required conditions for compliance status appears to be unmet either intentionally or unintentionally due to an action on the part of the body armor applicant. Suspension will result in the temporary removal of the body armor model from the NIJ Compliant Product List for the duration of the suspension period.

1.5.28

Test Identification Number

A unique identifier issued by the CTP to a body armor applicant for type testing of each armor model and to be included on all armor sample labels submitted for type testing. This test identification number is for the purpose of tracking the submitted armor model during the testing process.

1.5.29

type testing

Type testing is the initial testing of representative, pre-Listing body armor conducted by an NIJ-approved test laboratory in accordance with relevant standards specified by the CTP. The Compliance Test Report of type testing is used to document the type test performance (compliant or non-compliant) of armor models with applicable requirements. This CTR serves as a basis for the Listing decision and provides information for monitoring production body armor of that model and CTP follow-up monitoring of production quality assurance. Type testing is the primary means to demonstrate initial compliance with performance test requirements of the CTP for the purpose of listing an armor model.

1.5.30

Withdrawn

The compliance status of an NIJ listed armor model when, at the request of a body armor applicant, NIJ decides to remove the model from the NIJ Compliant Products List.

1.6 Program documentation

1.6.1 General

Assessors use NVLAP checklists to ensure that each laboratory receives a comprehensive on-site assessment that is comparable to that received by others. Checklists assist assessors in documenting the assessment to the NVLAP requirements found in NIST Handbook 150, this handbook, and the checklists themselves. Checklists contain definitive statements or questions about all aspects of the NVLAP criteria for accreditation, and form part of the On-Site Assessment Report (see NIST Handbook 150). The current version of each checklist is available on the NVLAP web site <<http://www.nist.gov/nvlap>>.

1.6.2 NIST Handbook 150 Checklist

All NVLAP programs use the NIST Handbook 150 Checklist which contains the requirements published in NIST Handbook 150. The checklist items are numbered to correspond to clauses 4 and 5 and Annexes A and B of NIST Handbook 150.

1.6.3 NIST Handbook 150-24 Checklists

The NIST Handbook 150-24 Checklists address the requirements specific to Body Armor testing given in NIST Handbook 150-24. The checklists contain requirements expressed at a more detailed level than found in this handbook.

1.6.4 Test Method Review Summary

The assessor uses the Test Method Review Summary to review the laboratory's ability to perform the Body Armor test methods. The review of the test method details by the assessor includes observing tests to having laboratory staff describe the test procedures. The assessor notes on the Test Method Review Summary the depth into which each part of the test method was reviewed (Observed Test, Examined Apparatus, Walked/Talked Through Test, Listened to Description of Procedures).

1.6.5 NVLAP Lab Bulletins

NVLAP Lab Bulletins are issued to laboratories and assessors, when needed, to clarify program-specific requirements and to provide information about program additions and changes.

1.6.6 Licenses

The laboratory must meet local, state, and federal licensing requirements, including import and export, as appropriate. NVLAP accreditation does not relieve a laboratory from complying with applicable federal, state, and local laws and regulations.

2 LAP establishment, development and implementation

This clause contains no information additional to that provided in NIST Handbook 150, clause 2.

3 Accreditation process

3.1 General

An overview of the laboratory accreditation process is provided in NIST Handbook 150, clause 3, and includes information pertaining to application for accreditation; management system review; on-site assessment; proficiency testing; accreditation decision; granting accreditation; renewal of accreditation; changes to scope of accreditation; monitoring visits; and suspension, denial, revocation, and voluntary termination of accreditation.

3.2 Management System Review

3.2.1 Prior to applying to NVLAP, the laboratory shall have a fully implemented management system. A copy of the quality manual and relevant associated documents shall be sent to NVLAP with the application forms.

3.2.2 Prior to an on-site assessment, one or more NVLAP assessors will review the laboratory documents to ensure they cover all aspects of the management system and, if followed, satisfy the requirements in NIST Handbook 150, and this handbook. During the review, the assessors may identify nonconformities and require changes to the management system so that it meets the requirements.

3.2.3 The laboratory shall create a cross-reference document allowing the laboratory and a NVLAP assessor to verify that the requirements of NIST Handbook 150-24 are addressed in the management system documentation.

3.2.4 NVLAP will review the management system documentation that addresses the specific requirements of the DOJ body armor certification program.

3.3 On-site assessment

3.3.1 The on-site assessment takes place at the laboratory site(s). Efforts will be made to minimize disruption to the normal work routines during the assessment.

3.3.2 The assessor will need time and workspace to complete assessment documentation during his/her time at the laboratory.

3.3.3 The laboratory shall have its facilities and equipment in good working order and be ready for examination according to the requirements identified in this handbook, NIST Handbook 150, and the laboratory's management system documentation, including the quality manual.

3.3.4 At the beginning of the on-site assessment, the laboratory shall make all supporting technical information available in a format that is conducive to a detailed review.

3.3.5 The documentation used for the assessment will include the NIST Handbook 150 Checklist, NIST Handbook 150-24 Checklists, and the Test Method Review Summary. The checklists and the technical specifics contained in this handbook ensure that the assessment is complete and that all assessors cover the same items at each laboratory.

3.3.6 The assessment activities will include the following:

- a) *Opening meeting:* The assessor(s) will meet with laboratory management, supervisory personnel, and other staff members at the discretion of the laboratory's management to explain the purpose of the on-site assessment and to discuss the schedule for the assessment activities.
- b) *Staff interviews:* The NVLAP assessor will interview individual staff members filling key positions (e.g., Laboratory Manager, Technical Director, Quality Manager, Authorized Representative) and staff members who have an effect on the outcome of the testing. The assessor may request that the laboratory staff be assembled to allow the assessor to quiz the staff as a whole on details of the standard, conduction of the test, management system, and other technical issues.
- c) *Records review:* The NVLAP assessor will review laboratory documentation, including the management system, quality manual, equipment maintenance and calibration records, recordkeeping procedures, testing procedures, laboratory test records and reports, personnel competency records, personnel training plans and records, and safeguards for the protection of sensitive and proprietary information. The NVLAP assessor may request additional information in an effort to clarify issues regarding a nonconformity, or to delve into a technical issue. Laboratory staff shall be available to answer questions.
- d) *Internal audit and management review:* The assessor will review and discuss with the laboratory staff the laboratory's internal audit and management review activities. The discussion will include all aspects of those activities including the management system procedures, the audit findings, the results of the management review, and the actions taken to resolve any problems.
- e) *Equipment and software:* The assessor will examine and determine suitability of all equipment and facilities required to perform the standard test methods for which the laboratory is accredited (or is seeking accreditation). The appropriate environmental conditions required for testing will be assessed. The assessor will review test data, examine hardware and software for function and appropriateness, and review software validation and verification procedures.
- f) *Demonstrations:* The assessor will observe demonstrations of selected testing procedures conducted by technical personnel assigned to conduct the tests and will discuss the tests to assure that the staff understands the procedure. The assessor may also select and trace the history of one or more samples from receipt to final issuance of a test report. These demonstrations are for the purpose of assessing laboratory competence; not the properties of any particular product.

Based on the Scope of Accreditation, demonstrations will include ballistics tests, environmental conditioning, and stab resistance tests.
- g) *Proficiency testing:* The assessor will discuss all aspects of any proficiency testing results with appropriate staff. Test methodology and records documenting the laboratory's execution of the testing will be reviewed and discussed. Unusual trends and outlying results will also be discussed. The assessor may provide materials and artifacts to the laboratory for proficiency testing during the on-site assessment. The assessor will make arrangements with the laboratory prior to the visit to ensure that facilities are available.
- h) *On-site assessment report:* The assessor will complete an on-site assessment report, which summarizes the findings and clearly lists nonconformities and comments (positive or negative).

This report normally consists of the On-site Assessment Report, NIST Handbook 150 Checklist, NIST Handbook 150-24 Checklists, and the Test Method Review Summary. The first page of the report is signed by the assessor and the laboratory's Authorized Representative to acknowledge the discussion, but this does not necessarily indicate agreement by the laboratory. A copy of the report is given to the laboratory representative for retention, and the assessor sends the original to NVLAP.

- i) *Closing meeting:* The assessor will conduct a closing meeting with laboratory personnel (see a) and b) above) to discuss findings. During the visit the assessor will have categorized all problems identified as nonconformities and comments, which will be discussed at the closing meeting. Resolutions may be mutually agreed upon. The assessor will specifically note items that have been corrected during the on-site assessment along with requirements for additional action. The process for resolving nonconformities identified during the on-site assessment is documented in NIST Handbook 150. Any disagreements between the laboratory and an assessor may be referred to NVLAP headquarters for resolution. All information obtained by the assessor is held in strictest confidence.

3.3.7 The laboratory shall address all nonconformities and provide a response to NVLAP within 30 days from the date of the assessment.

3.4 Proficiency testing

3.4.1 When proficiency testing programs are available and when instructed by NVLAP, laboratories are required to participate in proficiency testing for identified test methods and portions of test methods.

3.4.2 NIST Handbook 150 describes how proficiency testing is included in the accreditation process. Successful completion of proficiency testing is required prior to initial accreditation and periodically thereafter. Proficiency testing is used to evaluate the competence of the laboratory; it is not meant to be used to evaluate the products included in the Compliance Testing Program. Laboratories renewing accreditation must have satisfactorily participated in all required proficiency testing during their previous accreditation period.

To properly evaluate a laboratory, proficiency testing may consist of several parts. The proficiency test concept is designed to allow the evaluation of the laboratory's ability to produce repeatable and reproducible test data. Portions of the testing process may be "highlighted" in proficiency testing, e.g., equipment, software, test techniques, data logging, data analysis, test report generation, etc. Proficiency testing may consist of artifact testing before or during on-site assessments, oral quizzes during on-site assessments, and written examinations.

Laboratories will be informed, in advance, of specific proficiency testing activities. Testing shall be conducted according to instructions provided by NVLAP.

3.4.3 For proficiency testing conducted during on-site assessments, the assessor may bring materials and artifacts and/or the assessor may instruct the laboratory to have materials and test items available. The assessor will also inform the laboratory of any special equipment or configurations that may be required.

3.4.4 Proficiency testing may include: testing of vests and packs provided by NVLAP, measurement of artifacts to include weight and length, and examination of prepared artifacts. In some cases, the laboratory will be asked to include color photographs in the test report. For conditioning requirements in

the standard, proficiency testing may include measurement of temperature, relative humidity, and other parameters for a complete cycle as specified in the standard, e.g., one day, ten day, etc. For stab resistance, proficiency testing may include testing of NVLAP-provided stab packs and instrumentation of the stab test equipment.

3.4.5 The results of proficiency testing will be reported to the participants in appropriate documents and reports. Problems indicated by proficiency testing will be discussed with appropriate laboratory personnel responsible for developing and implementing plans for resolving the problems.

3.4.6 Generally, it is required that the specific proficiency test procedures be conducted in accordance with the applicable standard test method. At times, however, NVLAP may specify special conditions to assure uniformity in procedures and test conditions among participants. These may include the number of replicate measurements, specimen preparation, and other test parameters. Also, proficiency testing may consist of several parts in order that the operation of a laboratory might be evaluated. Portions of the standard test procedure may be emphasized, such as measurement, instrumentation, equipment, data analysis, and reporting. The proficiency testing shall not be contracted out to another laboratory.

3.4.7 When appropriate, proficiency test data are analyzed using statistical procedures to determine distributions and parameters, such as averages, standard deviations, and outliers (see ASTM E178). Using the test data from proficiency testing, the laboratory shall monitor its own testing performance. Procedures for receiving, analyzing, and monitoring the laboratory's test results shall be documented in its management system documentation.

3.4.8 Unsatisfactory performance in proficiency testing (e.g., outlying test results and incomplete test reports) is a technical nonconformity that must be resolved by the laboratory to maintain its accreditation for the test method(s) in question. After notification of unsatisfactory performance, the laboratory shall take corrective action to investigate and resolve nonconformities in a timely manner, according to the requirements of NIST Handbook 150 for the control of nonconforming work. Unsatisfactory performance in proficiency testing may result in suspension or revocation of accreditation for those test methods in question.

3.4.9 The results of proficiency testing are made available to NVLAP assessors for use during laboratory on-site assessment visits. Any problems indicated by proficiency testing are discussed with appropriate laboratory personnel responsible for developing and implementing plans for resolving the problems.

4 Management requirements for accreditation

4.1 Organization

A laboratory seeking NIJ Qualified Laboratory designation shall meet the additional organizational requirements for independence, domicile, etc., as specified by NIJ.

4.2 Management system

4.2.1 The requirements for a management system are contained in NIST Handbook 150, *NVLAP Procedures and General Requirements*.

4.2.2 The controlled version of the laboratory management system documentation may be either paper- or computer-based. The laboratory shall maintain version control in either case.

4.2.3 If the laboratory uses a computer-based documentation system, then the laboratory should consider the ease of usability by the staff. The laboratory shall ensure that the requirements of the NIST Handbook 150 are met so that the staff is knowledgeable of the online documentation system and can retrieve appropriate information.

4.2.4 The laboratory shall create a cross-reference document allowing the laboratory and a NVLAP assessor to verify that the requirements of NIST Handbook 150-24 are addressed in the management system documentation.

4.2.5 The laboratory shall develop, document, and implement procedures covering all of the technical requirements in this handbook.

4.2.6 In addition to the information specified in NIST Handbook 150, the quality manual and/or supporting management system procedures shall include the following:

- a) testing facilities and scope of services offered;
- b) testing equipment inventory;
- c) adoption and incorporation of new test methods and standards;
- d) test plan for each test method performed;
- e) acceptance criteria for test materials and specimens;
- f) action concerning damaged test materials and specimens;
- g) policy for utilizing subcontractors;
- h) licenses and permits for possession, import, and export of items and materials;
- i) NIJ and CTP requirements including: administrative, reporting (status, test results, availability, changes in scope), sampling, technical, non-technical;
- j) procedures and instructions for the laboratory interactions with CTP;
- k) policies, procedures, and instructions for participation in the CTP Conformity Assessment Follow-up program.

4.3 Document control

There are no requirements additional to those set forth in NIST Handbook 150.

4.4 Review of requests, tenders and contracts

Contracts for tests that are to be submitted to the Compliance Testing Program shall meet the requirements of the CTP in addition to all technical and NVLAP requirements.

4.5 Subcontracting of tests and calibrations

4.5.1 An NIJ- approved Testing Laboratory may subcontract the conditioning of armor. Ballistics tests and stab tests may not be subcontracted.

4.5.2 The subcontracting laboratory is responsible for the work of and reports from subcontracted laboratories.

4.5.3 The laboratory shall also meet the NVLAP requirements in NIST Handbook 150, Section 4.5, All aspects of the subcontracting shall be documented in the laboratory management system, including procedures and instructions for handling and shipping.

4.6 Purchasing services and supplies

4.6.1 The laboratory shall have procedures to verify that expendables meet the laboratory's requirements before those items are used for testing.

4.6.2 The laboratory shall evaluate vendors and verify or test incoming equipment, materials, and supplies that have an effect on the outcome of tests. Evaluations, verifications and tests shall be appropriately documented.

4.7 Service to the customer

There are no requirements additional to those set forth in NIST Handbook 150.

4.8 Complaints

When a CTR is returned to the laboratory for correction, completion, or modification, the laboratory shall treat this as a complaint.

4.9 Control of nonconforming testing and/or calibration work

4.9.1 The laboratory shall follow its documented procedures if it discovers that it has issued a test report that contains errors, including errors in testing, analysis, or reporting.

4.9.2 The laboratory must inform the client and offer remediation.

4.9.3 The laboratory shall also fulfill any additional NIJ requirements.

4.9.4 A NVLAP-accredited laboratory that acts as a subcontracted laboratory shall inform the subcontracting laboratory and the CTP in the event that nonconforming work is detected.

4.10 Improvement

There are no requirements additional to those set forth in NIST Handbook 150.

4.11 Corrective action

There are no requirements additional to those set forth in NIST Handbook 150.

4.12 Preventive action

There are no requirements additional to those set forth in NIST Handbook 150.

4.13 Control of records

4.13.1 Management and quality system records shall be maintained for at least three years.

4.13.2 Test records and test reports shall be kept for at least the period of time specified by the CTP.. Records shall be kept longer if required by contract, regulation, or the laboratory's own policies.

4.13.3 Records for each test, including the calibration of test equipment, shall contain sufficient information to permit the same or another laboratory to reproduce the test plan in a manner that would make it possible to obtain comparable test results.

4.13.4 The laboratory shall have policies and procedures concerning confidentiality and nondisclosure that meet the requirements of the customer, NIJ and the Compliance Testing Program.

4.14 Internal audits

4.14.1 Internal audits shall include compliance with CTP and NIJ requirements including Certification Test Reports (CTR) and documents and activities specific to NIJ testing.

4.14.2 An applicant laboratory shall conduct at least one complete internal audit prior to the first on-site assessment and shall submit it to NVLAP with the management system documentation.

4.14.3 For accredited laboratories, internal audit reports conducted since the previous on-site assessment shall be made available for review.

4.15 Management reviews

4.15.1 Periodic reviews of the management system shall reflect adherence to NVLAP requirements and the laboratory's quality objectives.

4.15.2 An applicant laboratory shall perform at least one complete management review prior to the first on-site assessment and shall submit it to NVLAP with the management system documentation.

4.15.3 The report of the management review shall be available during the NVLAP on-site assessment.

5 Technical requirements for accreditation

5.1 General

The management system shall contain or refer to documentation that describes and details the laboratory's implementation of procedures covering all of the technical requirements in NIST Handbook 150 and NIST Handbook 150-24.

5.2 Personnel

5.2.1 The laboratory shall have a detailed and documented description of its training program for new and current staff members. Tests run by new staff members shall be monitored by a senior staff member whose performance has been demonstrated to be acceptable until the new staff member demonstrates the required level of performance. The laboratory shall establish and document performance criteria to determine when a new staff member is qualified to work independently.

5.2.2 Laboratory staff members shall be able to obtain enough information from the laboratory's quality documentation and procedures to perform tests in the absence of the laboratory manager. Specific evidence that all staff members have been trained for their role in the quality assurance program is required.

5.2.3 All laboratory staff and supervisors shall understand the basic concepts behind the testing of test specimens. They shall understand the impact of deviations on the test, and understand how to monitor the test conditions in order to prevent deviations from occurring. Laboratory staff members should, upon request, during an on-site visit by a NVLAP assessor be able to demonstrate their methodology for verification that deviations have not occurred during the test.

5.3 Accommodation and environmental conditions

5.3.1 The laboratory shall have appropriate facilities and environment for the secure acceptance and storage of all test materials for the conditioning of materials prior to testing according to the standard, for the safe storage of flammable and explosive materials, and for the safe conduct of all testing.

5.3.2 The laboratory shall take appropriate measures for controlling access to and safe handling of firearms, ammunition, and armor samples.

5.3.3 Laboratories shall achieve, maintain, and monitor laboratory environmental conditions that meet the requirements of the standards.

5.3.4 Laboratories conducting environmental conditioning of test items shall have equipment to achieve, maintain, and monitor conditions that meet the requirements of the standards and the laboratory management system.

5.4 Test and calibration methods and method validation

5.4.1 The laboratory's accreditation may be limited to a subset of tests. The laboratory shall have written procedures that describe how each test method is implemented in the laboratory and shall conform

in all respects with the test method except when a departure becomes necessary for technical reasons. When a departure is necessary, it shall be approved in writing by the customer and/or the Compliance Testing Program and stated in the test report.

5.4.2 The laboratory shall have detailed instructions for the conduct of all tests for which it is accredited. The laboratory is responsible for determining what additional instructions are necessary. The laboratory shall write, implement, and audit the effectiveness of all applicable instructions before initial accreditation can be granted.

5.4.3 The laboratory shall ensure that it uses the latest valid edition of a standard unless it is not appropriate or possible to do so. When necessary, the standard shall be supplemented with additional details to ensure consistent application.

5.4.4 The laboratory shall have procedures and instructions for modifying all relevant management system documents when new versions of standards are issued. This includes drafts of standards when use of those drafts is required by the customer or the CTP. This also includes modification to management system documents when clarifications of standards are issued by appropriate bodies.

5.4.5 The laboratory shall review CTP Administrative Clarifications before beginning a test series and implement the clarifications as appropriate.

5.4.6 The laboratory may include old and new versions of standards in its management system when multiple versions are included in their scope of accreditation or when required by customers or the CTP.

5.4.7 The laboratory shall abide by equipment calibration and tolerance requirements per the standard, as well as verification of the test setup as detailed in the test method.

5.4.8 The laboratory shall keep itself informed of CTP Administrative Clarifications. If these clarifications have an affect on the test method, then the laboratory shall take appropriate actions, including review and modification of test instructions and training of laboratory staff.

5.4.9 The laboratory shall include in its test instructions the "Type Testing Guidance" from the *CTP Ballistic Test Laboratory Application Package*.

5.4.10 The laboratory shall have documented test plans to ensure proper implementation of the test methods. The test plan shall include the order of the conduct of testing and stop points.

5.5 Equipment

5.5.1 The laboratory shall have the equipment necessary to perform the test methods as described in the current NIJ standards and the NIST Handbook 150-24 Checklists.

5.5.2 Measuring instruments, e.g., scales, rulers, thermometers, micrometers, and timers shall be calibrated in accordance with NIST Handbook 150, Annex B.

5.6 Measurement traceability

5.6.1 Laboratory measurements shall be made using measurement and test equipment that has been calibrated and is suitable for use. Calibrations shall be performed by a laboratory that meets the requirements of NIST Handbook 150, Annex B.

5.6.2 A laboratory may calibrate or verify its own measurement and test equipment if it has trained personnel, written instructions, and the proper equipment and environment to provide traceability.

5.7 Sampling

5.7.1 The term “sampling” is defined in NIST Handbook 150, Section 5.7.1, note 1. In NIJ Standards the number of armor samples is not sampling, however, the selection of a test set from a larger population of armor is sampling.

5.7.2 When the laboratory is conducting compliance testing, it shall meet the requirements of the CTP including sample selection, sample size, and location of shots. Issues concerning sampling shall be directed to the CPT.

5.7.3 When the NIJ standard or customer contract requires that some, but not all, of the armor or items being tested be treated differently from the rest of the items, this shall be considered sampling. The laboratory shall have procedures and instructions for sampling (selection of items from the group) per the NIJ standard or the customer contract.

5.7.4 The laboratory shall have procedures for collecting specimens or for verifying that provided samples meet the laboratory requirements.

5.7.5 The laboratory shall record in its own records and in test reports the organization that selected the items for testing.

5.7.6 When a customer sends test samples with requirements for special or non-standard testing then the laboratory shall abide by these customer requirements. An explanation of deviations from standards shall be included in the test report.

5.8 Handling of test and calibration items

5.8.1 The laboratory shall have procedures for handling test specimens to avoid damage or exposure to known sources that may affect specimen performance (i.e. heat, light, moisture).

5.8.2 The laboratory shall have instructions that meet the requirements of the CTP, the laboratory standard procedure, or custom instructions based on a customer contract.

5.8.3 After the testing is completed, the laboratory shall follow its documented procedures for appropriate storage, disposal, or shipping of tested items. When applicable, appropriate chain-of-custody procedures shall be followed.

5.9 Assuring the quality of test and calibration results

5.9.1 The laboratory shall have a system for data-taking that ensures error-free logging, transcription to the CTR, and recording of all relevant data and parameters for ballistics testing, environmental

conditions, soft and hard armor conditioning, and stab resistance testing. Where applicable, this shall include two-person verification of readings and recordings.

5.9.2 When the results of a critical measurement are not durable, e.g., the digital display of time or velocity on the chronometer, the laboratory shall have a procedure that ensures the error-free transcription of the information from the instrument to the permanent record.

5.9.3 The laboratory shall ensure that the provisions of NIJ-standard 0101.06, section 7.8.5.1 are met. For BFS measurements greater than 40 mm, the laboratory shall ensure that two independent measurements are made and recorded.

5.9.4 The laboratory shall have procedures and instructions for velocity development for each threat used for testing by the laboratory. A record of the velocity development for each threat shall be kept in the laboratory records.

5.9.5 The laboratory shall have procedures and instructions for data integrity. This includes handwritten data and computer generated data. Tables and charts shall be appropriately labeled. Handwriting shall be unambiguously legible. Analog charts shall be fully labeled. Data shall be taken and recorded with sufficient resolution. Where appropriate, photographs may be used to document observations.

5.10 Reporting the results

5.10.1 Compliance Test Reports (CTR) submitted to the CTP for testing to NIJ 0101.06 shall meet the requirements of the standard, the CTP and NVLAP.

5.10.2 Test reports submitted to the CTP for testing to NIJ 0115.00 shall meet the requirements of the standard, the CTP and NVLAP.

5.10.3 If not provided for by the CTR, the laboratory shall record in a notes section of the spreadsheet the following: name of Approved Signatory, NVLAP Lab Code, and, if appropriate, tests included in the CTR that are not within the laboratory's scope of accreditation.

5.10.4 Raw data and other information required by NIST Handbook 150, but not included in the CTR, shall be documented in the laboratory records. The information contained in the report and the laboratory records shall be sufficient to allow tests to be repeated or reproduced.

5.10.5 Test reports for purposes other than the CTP shall meet the requirements of the contract, regulation, or the laboratory's management system. Raw data and other information required by NIST Handbook 150, but not included in the test report, shall be kept in the laboratory records. The information contained in the report and the records shall be sufficient to allow tests to be repeated or reproduced.

6 Additional requirements

There are no additional requirements beyond NIST Handbook 150 and its associated normative annexes, and any other normative references previously cited in this handbook.