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国家航空航天无损检测人员资格鉴定与认证准则

National Aerospace NDT Personnel Qualification and Certification Regulation

航空航天无损检测认证部秘书处

Secretariat of National Aerospace NDT Board of China

2026. 05. 30

航空航天无损检测认证部
NANDTB-CN
National Aerospace NDT Board of China

前 言

本文件等同采用美宇航 NAS410,Revision6 和欧盟 EN4179,Edition7 标准技术要求，满足国家标准 GB/T 36439—2018《无损检测 航空无损检测人员资格鉴定与认证》技术要求。本文件是航空航天无损检测认证部（NANDTB-CN）开展航空航天无损检测人员资格鉴定与认证的依据，适用于中国及周边地区从事航空航天制造、服务、维护和修理的无损检测从业人员资格鉴定培训和考试工作，助力国际转包、民机制造、商业航天、低空经济等产业高质量可持续发展。

This document is equivalent to NAS410, Rev6, 2020 and EN4179, Edition7, and requirements meet the Chinese National StandardsGB/T 36439-2018. This document is the basis for the qualification assessment and certification of aerospace non-destructive testing personnel by the Aerospace Non Destructive Testing Certification Department (NANDTB-CN). It is applicable to the qualification assessment training and examination of non-destructive testing practitioners engaged in aerospace manufacturing, service, maintenance, and repair in China and surrounding areas, and helps promote the high-quality development of high-end equipment manufacturing such as international subcontracting, civil aircraft manufacturing, commercial aerospace, and low altitude economy.

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机构简介

中国“航空航天无损检测认证部”（National Aerospace NDT Board of China，英文缩写：NANDTB-CN）成立于 2006 年 8 月 2 日，是经国防科技工业政府主管部门批准，国防科技工业无损检测人员资格鉴定与认证委员会发文成立，按照 NAS410/EN4179 标准中 NANDTB 的要求开展无损检测人员资格鉴定与认证工作的第三方独立技术组织，已获得国内外主承包商及供应商的广泛支持和认可。航空航天无损检测认证部（NANDTB-CN）始终秉承“公正规范、专业权威、守正创新”基本原则，依据 NANDTB-CN-R01 认证准则（等同采用国际宇航 NAS410/EN4179 标准），为从事航空航天及高端装备无损检测人员提供专业规范的资格鉴定培训和考试服务。同时充分发挥专家资源优势，为行业提供无损检测技术研讨交流与咨询服务，搭建沟通桥梁与交流平台，推动国际交流与合作，促进行业技术进步，助力国际转包、民机制造、商业航天、低空经济等产业高质量发展。

The National Aerospace NDT Board of China (NANDTB-CN), established on August 2, 2006, is a third-party independent technical organization approved by the government department in charge of national defense science and technology industry. It was founded by the Non-Destructive Testing Personnel Qualification and Certification Committee of the national defense science and technology industry. NANDTB-CN carries out non-destructive testing personnel qualification and certification work in accordance with the requirements of NANDTB in the NAS410/EN4179 standard. It has received extensive support and recognition from major domestic and international contractors and suppliers. NANDTB-CN always adheres to the basic principles of "fairness and standardization, professional authority, and integrity and innovation". Based on the NANDTB-CN-R01 certification criteria (equivalent to the international aerospace NAS410/EN4179 standard), it provides professional and standardized qualification training and examination services for personnel engaged in non-destructive testing in aerospace and high-end equipment. At the same time, it fully utilizes expert resources to provide non-destructive testing technology research, exchange, and consulting services for the industry, builds communication bridges and platforms, promotes international exchanges and cooperation, facilitates technological progress in the industry, and supports high-quality development in industries such as international subcontracting, civil aircraft manufacturing, commercial aerospace, and low-altitude economy.

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1 引言 INTRODUCTION

1.1 范围 SCOPE

本文件规定了从事航空航天制造、服务、维护和修理工作的无损检测（NDT）、无损检验（NDI）或无损评价（NDE）人员的资格鉴定与认证方面的最低要求。本文件使用了术语 NDT，并将其视为等同于 NDI 和 NDE。

在欧洲，“批准”一词表示雇主以书面形式声明某个人已满足特定要求并获得了操作授权。在本文件中，3.3 中定义的术语“认证”被用来替代术语“批准”。除程序文件中另有规定外，根据本文件要求进行的认证包括操作授权。

This document establishes the minimum requirements for the qualification and certification non-destructive testing (NDT), nondestructive inspection (NDI), or nondestructive evaluation (NDE) in the aerospace manufacturing, service, maintenance and overhaul industries. For the purposes of this document, the term NDT will be used and will be considered equivalent to NDI and NDE.

In Europe, the term “approval” is used to denote a written statement by an employer that an individual has met specific requirements and has operating approval. The term “certification” as defined in 3.2 is used throughout This document as a substitute for the term “approval”. Except when otherwise specified in the written practice, certification in accordance with This document includes operating approval.

航空航天无损检测认证部(NANDTB-CN)主要服务于从事航空航天制造和服务的 NDT、NDI、NDE 人员的资格鉴定与认证，不承担维护和修理工作的 NDT、NDI、NDE 人员的资格鉴定与认证。

NANDTB-CN primarily serves the qualification and certification of NDT, NDI, and NDE personnel engaged in aerospace manufacturing and services, and does not undertake the qualification and certification of NDT, NDI, and NDE personnel involved in maintenance and repair work.

1.2 目的 PURPOSE

1.2.1 适用性 APPLICABILITY

本文件适用于以下人员：

——用无损检测方法或设备检测及验收材料、产品、零部件、组件或子组件的人员；

——对所用 NDT 方法和设备的技术充分性负责的人员；

——操作自动判读或评估系统的人员；

——批准 NDT 工艺规程或工艺卡的人员；

——审核 NDT 机构；

——提供 NDT 技术支持或培训的人员。

This document applicable to personnel who:

——Use NDT methods or equipment to test and/or accept materials, products, components, assemblies or sub-assemblies.

——Are directly responsible for the technical adequacy of the NDT methods and equipment used.

——Operate automatic interpretation or evaluation systems;

——Approve NDT procedures and/or work instructions

——Audit NDT facilities, or

——Provide technical NDT support or training.

本文件不适用于仅对无损检测人员进行管理和监督，或从事无损检测技术研究开发的人员，即便在后续实施时需要得到 3 级人员批准。使用特定的直读仪器执行专项检测的人员相关规定见 8.1。

This document does not apply to individuals who only have administrative or supervisory authority over NDT personnel or to research personnel developing NDT technology for subsequent implementation and approval by a certified Level 3.See Section 8 regarding applicability to personnel performing specialized inspections using certain direct readout instruments.

1. 2. 2 实施 IMPLEMENTATION

本文件规定了国家航空航天无损检测委员会的使用，国家航空航天无损检测委员会仅需按照附录 C 的要求执行，并不强制要求必须成立国家航空航天无损检测委员会来满足本文件要求。对于按照 NAS410/EN 4179 的先前版本认证的人员，在其当前认证到期前无需按照本文件要求重新进行认证。

This document addresses the use of a National Aerospace NDT Board (NANDTB). NANDTBs are only used as specified per Appendix C and it is not mandatory to have such a board for compliance with this document. Personnel certified to previous revisions of NAS410/EN 4179 need not recertify to the requirements of This document until their current certification expires.

航空航天无损检测认证部（NANDTB-CN）按照本文件的国家航空航天无损检测委员会（NANDTB）实施。根据 NANDTB-CN 规定，本文件实施日期为 2026 年 5 月 30 日。

NANDTB-CN implements this document in accordance with the National Aerospace Non-Destructive Testing Board (NANDTB). According to NANDTB-CN, the implementation date of this document is May 30, 2026.

1. 2. 3 无损检测方法 NDT METHODS

本文件包含了下列常用无损检测方法的详细要求：

This document contains detailed requirements for the following common NDT methods:

- 涡流检测 Eddy Current Testing（ET）
- 磁粉检测 Magnetic Particle Testing（MT）
- 渗透检测 Liquid Penetrant Testing（PT）
- 射线检测 Radiographic Testing（RT）
- 超声检测 Ultrasonic Testing（UT）
- 红外成像检测 Thermographic Testing（IRT）

- 激光散斑检测 Shearography Testing（ST）

当工程或质量部门、认可的工程组织或总承包商提出要求时，本文件也适用于确定材料、零件、部件、子组件或组件的预期用途的其他无损检测方法。此类方法可包括但不限于声发射检测、中子射线照相检测、泄漏检测和激光全息照相检测。

When invoked by engineering, quality, cognizant engineering organization or prime contractor requirements, This document applies to other NDT methods used to determine the acceptability or suitability for intended service of a material, part, component, sub-assembly or assembly. Such methods may include, but are not limited to, acoustic emission, neutron radiography, leak testing and holography.

按照 NANDTB-CN 规定，本文件还包括了腐蚀检测，详细要求见附件 E。

According to NANDTB-CN regulations, this document also includes Etch Inspectors. Detailed requirements are provided in Annex E.

2 规范性引用文件 NORMATIVE REFERENCES

2.1 标准 STANDARDS

本文件引用了下列标准文献。若未注明引用文件的版本号，则适用其最新版本；若已注明特定版本号，则仅该版本适用。

The following documents are referenced in this document. If the revision number of a reference is not specified, the latest revision of the referenced document applies. If a revision number is referenced, only that version applies.

EN 4179 航空航天系列—无损检测人员资格鉴定与批准

Aerospace Series - Qualification and Approval of Personnel for Nondestructive Testing

注：欧洲航空航天和国防工业协会标准化组织 www.asd-stan.org/en EN 4179，

Association of Aerospace and Defense Industries of Europe—Standardization www.asd- stan .org/en

ISO 9712 无损检测—无损检测人员资格鉴定与认证

Non-destructive Testing - Qualification and Certification of NDT Personnel

注：国际标准化组织 https://www.iso.org/home.html

International Organization for Standardization https://www.iso.org/home.htm

ISO 18490 无损检测—无损检测人员视力评定

Non-destructive Testing – Evaluation of Vision Acuity of NDT Personnel

GB/T 9445 无损检测 人员资格鉴定与认证（等同采用 IDT ISO 9712）

GB/T 40117 无损检测 无损检测人员视力评价（等同采用 IDT ISO 18490）

GB/T 36439—2018《无损检测 航空无损检测人员资格鉴定与认证》（等效采用 EQV NAS410.Revision4）

2.2 优先顺序 ORDER OF PRECEDENCE

如果本文件的内容与此处引用的参考文件之间存在冲突，则以本文件的要求为准。

除非获得特别豁免，否则本文件中的任何内容均不得取代适用法律法规。

In the event of a conflict between the text of this document and the references cited herein, the requirements of this document take precedence. Nothing in this document supersedes applicable laws and regulations unless a specific exemption has been obtained.

3 术语和定义 TERMS AND DEFINITIONS

对于本文件，下列术语和定义适用。若未对术语进行定义，则应根据其在使用上下文中通常接受的含义予以定义。

For the purposes of this document, the following terms and definitions apply.Where terms are not defined, they shall be defined using their ordinarily accepted meanings within the context in which they are used.

3. 1 自动化设备 AUTOMATED EQUIPMENT

在执行任务中无需人工干预，能部分或全部自主完成任务的机器、系统及装置。

machinery, systems, and/or apparatuses designed to perform tasks, partially or fully, without human intervention in the task being performed

3. 2 基础考试 BASIC EXAMINATION

考核 3 级报考人对无损检测方法知识、材料和制造工艺熟悉程度以及 NAS410/EN4179 要求的一种考试。无损检测方法知识应包含雇主所用的方法，并达到 2 级人员能力水平。

examination utilized to verify a Level 3 candidate's knowledge of NDT methods, materials, and manufacturing processes, including those used by the employer, at a Level 2 proficiency and NAS410/EN4179 requirements.

3. 3 认证 CERTIFICATION

雇主向符合本文件中的适用要求的人员颁发书面凭证。

written statement by an employer that an individual has met the applicable requirements of This document.

3. 4 闭卷考试 CLOSED BOOK EXAMINATION

不使用任何参考资料的考试。

examination administered without access to any reference materials.

3. 5 认可的工程组织 COGNIZANT ENGINEERING ORGANIZATION

总承包商、OEM（原始设备制造商）或最终用户授权作出有关无损检测决定，并且给出无损检测相关批准的工程或无损检测组织。

engineering or NDT organization of the prime contractor, OEM (Original Equipment Manufacturer), or end user authorized to make NDT-related decisions and give NDT-related approvals.

3.6 委员会或专家小组会议 COMMITTEE OR PANEL MEETINGS

由地区性、全国性或国际性无损检测组织或技术协会组织或赞助的会议、大会、专题讨论会、研讨会、行业协会会议、座谈会等。

meetings, conferences, symposia, seminars, trade association meetings, panels, etc. organized or sponsored by a regional, national or international NDT organization or technical society.

3.7 委员会项目 COMMITTEE PROJECTS

地区性或全国性技术协会、委员会或工作组开展的具体可确认的官方活动，如圆桌会议或各项研究，编写指南、附录、规范、推荐规范、工艺规程、法规或标准等。

specific identifiable official activities of regional or national technical societies, committees or work groups, such as round robins or individual studies, preparation of guidelines, appendices, specifications, recommended practices, procedures, codes or standards, etc.

3.8 直接观察 DIRECT OBSERVATION

观察者能够以一种与学员进行视觉和口头双向交流，而不被干扰的方式来观察无损检测过程。

when the observer is able to view the NDT process in a manner that permits uninterrupted, visual and verbal two way contact with the trainee.

3.9 直读式仪器 DIRECT READOUT INSTRUMENT

以尺寸或电荷为单位(例如英寸、毫米或%IACS)，通过数字读数或以模拟显示器显示测量值的仪器，如标尺/指针结构，或该显示输出为通过/不通过，此类仪器的设置及检查不需要具备特殊技能或知识，也不涉及如阈值、延迟、增益或相位等参数或信号显示的调节即可获得测量值。例如，常见的直读式仪器包括不带示波器显示的超声测厚仪和涡流涂层测厚仪。

instruments that physically display measurements in dimensional or electrical units (e.g. inches, millimeters or %IACS) either as digital readout or an analog display, such as a scale/pointer configuration, or that display go/no-go outputs, and do not require special skills or knowledge to set up the instrument or inspection and do not involve adjusting parameters or signal displays such as gates, delays, gain, or phase to obtain measurements. For example, common direct readout instruments include basic ultrasonic thickness gauges without an oscilloscope display, and eddy current coating thickness gauges.

3.10 文件化 DOCUMENTED

以书面或电子形式记录的状态。

condition of being recorded in written or electronic form.

3.11 雇主 EMPLOYER

雇佣或聘用一个或多个从事无损检测工作人员的组织。

注：此定义包括个体经营者。

organization employing or contracting the services of one(1) or more individuals who perform NDT.

NOTE: Self-employed individuals are included in this definition.

3.12 评定 EVALUATION

在对无损检测过程中记录的显示作出解释后进行的评审，以确定显示是否符合规定的验收标准或确定显示的严重程度。

review following interpretation of the indications noted during an NDT inspection to determine whether the indications meet specified acceptance criteria or to determine the significance of the indication.

3.13 考试 EXAMINATION

为验证报考人的视力、无损检测技能或知识，按照程序文件要求进行的正式、受控且有书面证明的考核。

formal, controlled, documented testing conducted in accordance with a documented written practice to verify a candidate's visual capability, skill or knowledge of an NDT method.

3.14 主考人 EXAMINER

按照本文件要求认证且由责任 3 级人员授权，以在其认证的无损检测方法范围内管理全部或部分资格鉴定过程的 3 级人员。

level 3 certified to This document and designated by the Responsible Level 3 to administer all or part of the qualification process in the NDT method(s) in which the Examiner is certified.

3.15 实践经历 EXPERIENCE

按照预期的职责或培训计划，在工作中通过在检测线上的实际操作无损检测方法获得知识和技能的经历。

注：这不包括正式课堂培训，但可包括雇主程序文件中规定的实验室工作和在职培训。

actual performance of an NDT method conducted in the work environment in line with expected duties/training plan, resulting in the acquisition of knowledge and skill.

NOTE: This does not include formal classroom training, but may include laboratory and on-the-job training as defined by the employer's written practice.

3.16 正式教育 FORMAL EDUCATION

在技校、大专或大学的理工科专业的学习经历。

engineering or physical science studies at a technical school, college, or university.

3.17 正式培训 FORMAL TRAINING

以传授按本文件进行资格鉴定所需的知识和技能为目的进行的有组织的、文件化的教学活动。

注：经责任 3 级人员或主考人批准，正式培训可采取课堂授课、实际操作和自学相结合的形式。

organized and documented program of learning activities designed to impart the knowledge and skills necessary to be qualified to this document.

NOTE:Formal training may be a mix of classroom, practical and programmed self- instruction as approved by the Responsible Level 3 or Examiner.

3. 18 理论考试 GENERAL EXAMINATION

针对一种无损检测方法的基本原理和理论进行的书面考试。

written examination addressing the basic principles and theory of an NDT method.

3. 19 显示 INDICATION

无损检测获得的需要作出解释的响应或证据。

response or evidence of a condition resulting from an NDT inspection that requires interpretation.

3. 20 教员 INSTRUCTOR

由责任 3 级人员或主考人指定或批准的为无损检测人员提供正式培训和指定为 NDT 人员提供在职培训的人员。

individual designated or approved by the Responsible Level 3 or Examiner to provide formal training and who may be designated to provide on-the-job training for NDT personnel.

3. 21 解释 INTERPRETATION

显示是否为相关显示或不相关显示的确定。

determination of whether indications are relevant or non-relevant.

3. 22 方法 METHOD

一种包含不同技术的无损检测学科（如超声检测、射线照相检测等）。

one of the disciplines of nondestructive testing (e.g.,ultrasound, radiography) within which different techniques may exist.

3. 23 国家航空航天无损检测委员会 NATIONAL AEROSPACE NDT BOARD (NANDTB)

由主承包商参与并特许，经国家监管机构认可的的独立航空航天组织，代表国家航空航天工业，根据本文件的附录 C 要求提供或支持无损检测人员资格鉴定和考试服务。

independent aerospace organization representing a nation's aerospace industry that is chartered by the participating prime contractors and recognized by the nation’s regulatory agencies to provide or support NDT qualification and/or examination services in accordance with Appendix C of This document.

3. 24 非胶片射线照相检测 NON-FILM RADIOGRAPHY

不用胶片作为记录介质的射线照相检测。示例：非胶片射线照相检测包括但不限于计算机照相检测（CR）、数字成像检测（DR）、实时成像检测（RR）和层析成像检测（CT）。

radiographic imaging that does not use a film-based recording medium. EXAMPLE: Non-Film

radiography includes, but may not be limited to, Computed Radiography, Digital Radiography, Radioscopy, and Computed Tomography.

3. 25 在职培训 ON-THE-JOB TRAINING

在提供了适当技术指导的条件下，在工作环境中进行的旨在获得仪器设定、设备操作、工艺应用以及显示的识别、解释和评定方面的实践经历的培训。

training in the work environment to gain experience in learning instrument set-up, equipment operation, applying the process, and recognition, interpretation and evaluation of indications under appropriate technical guidance.

3. 26 开卷考试 OPEN BOOK EXAMINATION

在考试中允许查看所提供的或指定参考资料的一种考试。

examination administered with access to specific reference material that is provided with or referenced in the examination.

3. 27 操作授权 OPERATING APPROVAL

雇主根据认证范围签发的授权个人完成指定任务的书面证明。

注：此类授权可取决于雇主对操作人员进行的工作培训或特定任务培训。

written statement issued by the employer, based upon the scope of certification, authorizing the individual to carry out defined tasks.

NOTE:Such authorization can be dependent on the employer having provided job or task-specific training.

3. 28 外部机构 OUTSIDE AGENCY

独立雇主之外的公司或组织，按照本文件要求提供无损检测人员培训和考试服务。

注：提供无损检测资格鉴定及考试服务的国家航空航天无损检测委员会、咨询机构和个体经营者也属于这一范畴。

independent company or organization outside the employer who provides NDT services to implement the requirements of This document, such as training and examination of NDT personnel.

NOTE: National Boards (NANDTB) that provide NDT qualification and/or examination services, consultants and self-employed individuals are included in this definition.

3. 29 实操考试 PRACTICAL EXAMINATION

证明个人执行雇主所用无损检测方法的能力的考试。

examination to demonstrate an individual's ability to conduct an NDT method as used by the employer.

3. 30 总承包商 PRIME CONTRACTOR

对系统、部件或产品的设计、控制和交付负全部责任的组织。

organization having overall responsibility for design, control and delivery of a system, component or product.

3. 31　工艺规程 PROCEDURE

用于指导“如何”执行某一特定工艺的通用书面说明。注：工艺规程随后被用于编制 3.40 中定义的工艺卡。

written general “how to” instruction for conducting a given process. NOTE: Procedures are then used to develop work instructions, as defined in 3.40.

3. 32　资格鉴定 QUALIFICATION

人员正确按照特定等级要求工作所需的技能、培训、知识、考试、实践经历和视力。

skills, training, knowledge, examinations, experience and visual capability required for personnel to properly perform to a particular level.

3. 33　被认可的 NDT 资格计划 RECOGNIZED NDT QUALIFICATION PROGRAM

被 NANDTB 或监管机构认可为满足 EN4179/NAS410 培训、经验和/或考试要求的 NDT 资格计划。

注：责任 3 级人员可在审查培训/经验/考试范围并确保满足任何补充要求后，接受此类文件作为满足 EN4179/NAS410 相关要求的证据。

NDT qualification program recognized by the relevant NANDTB or regulatory authority as meeting the requirements of EN4179/NAS410 for training and/or experience and/or examination requirements.

NOTE: The Responsible Level 3 may accept such documentation as meeting the relevant requirements of EN4179/NAS410 subject to reviewing the scope of training/experience/examination and ensuring any supplemental requirements are met.

3. 34　责任 3 级人员 RESPONSIBLE LEVEL 3

由雇主指定、全权负责并代表雇主确保本文件的各项要求都得到满足的经过认证的 3 级人员。

individual certified as a Level 3 and designated by the employer with the sole responsibility and authority to ensure that the requirements of This document are met and to act on behalf of the employer.

3. 35　专门考试 SPECIFIC EXAMINATION

用于确定个人对雇主所用无损检测方法的工艺规程、法规、标准、产品知识、技术、设备和规范的理解程度的书面考试。

written examination to determine an individual's understanding of operating procedures, codes, standards, product knowledge, techniques, equipment and specifications for an NDT method as used by the employer.

3. 36　分包商 SUB-CONTRACTOR

进行航空航天产品制造或维护，并对主承包商负责的组织。示例：在本文件中，分包商包括供应商和加工商。

An organization responsible to the prime contractor for the manufacture or maintenance of aerospace products. EXAMPLE:For the purposes of This document, this includes suppliers and

processors.

3. 37 任务 TASK

认证所需的活动。

activity for which certification is required,.

3. 38 技术 TECHNIQUE

雇主在程序文件中规定的方法中的一个类别。

category within a method as defined in the written practice by the employer.

3. 39 考试试件 TEST SAMPLE

在实操考试中，为考查报考人对某种无损检测方法的掌握情况而使用的包含一种(1)或多种已知且有文件记录的自然或人工不连续、缺陷或状态的零件或图像。考试试件可以是实际零件、制造的试验零件或者实际零件的图像，如射线照相底片。

A part or image containing one(1) or more known and documented natural or artificial discontinuities, flaws or conditions used in the practical examination to demonstrate the candidate's proficiency in an NDT method. Test samples can refer to actual hardware, fabricated test parts, or, when applicable, images of actual hardware such as radiographs.

3. 40 工艺卡 WORK INSTRUCTION

详细描述特定部件、某类零件（例如“铝挤压件”或“钢支架”）或部件的无损检测技术和检测参数的文件。

注 1：行业内有时也称之为“技术表”或“数据卡”。

注 2：此类工艺卡以 3.30 中规定的工艺规程为基础。

A document detailing the NDT technique and testing parameters to be used for the inspection of a specific component, group of parts (e.g. “aluminum extrusions” or “steel brackets”), or assembly.

NOTE 1:These are sometimes referred to in the industry as “technique sheets” or “data cards”.

NOTE 2: Such work instructions are based on procedures defined in 3.30.

3. 41 书面 WRITTEN

可检索的电子文档或硬拷贝文档。

Retrievable electronic or hard copy.

3. 42 程序文件 WRITTEN PRACTICE

描述雇主控制和管理无损检测人员资格鉴定与认证过程的要求和方法的文件。

Document that describes an employer’s requirements and methodology for controlling and administering the NDT personnel qualification and certification process.

4 一般要求 GENERAL REQUIREMENTS

4.1 程序文件 WRITTEN PRACTICE

4.1.1 资格鉴定与认证 QUALIFICATION AND CERTIFICATION

雇主应制定并保持符合本文件要求的无损检测人员资格鉴定与认证程序文件。书面实践应说明雇主实施无损检测资格鉴定与认证计划所需的程序方面细节，还应包括无损检测资格鉴定与认证过程的细节，包括：

- 雇主所使用的资格鉴定与认证等级；
- 人员的职责和义务；
- 培训和实践经历要求；
- 认证和更新认证要求；
- 记录和记录保存要求；
- 证书过期、暂停、撤销和恢复要求；
- 年度熟练程度评审程序。

程序文件应由责任 3 级人员批准。程序文件应可供雇主的顾客和监管机构审查。

The employer shall develop and maintain a written practice for the qualification and certification of NDT personnel that meets the requirements of This document. The written practice shall address the procedural details necessary for the employer to implement an NDT qualification and certification program and shall include the details of the NDT qualification and certification process, including:

- The levels of qualification and certification used by the employer;
- Personnel duties and responsibilities;
- Training and experience requirements;
- Certification and recertification requirements;
- Records and record keeping requirements;
- Requirements for expiration, suspension, revocation and reinstatement of certifications;
- Process for annual proficiency review.

The written practice shall be approved by the Responsible Level 3. The written practice shall be available for review by the employer's customer(s) and regulatory agencies.

4.1.2 附加要求 ADDITIONAL REQUIREMENTS

程序文件应包括雇主或认可的工程组织提出的任何附加要求，如附加认证等级或增加的实践经历要求。

The written practice shall include any additional requirements levied by the employer or cognizant engineering organization, such as additional certification levels or increased experience requirements.

4.1.3 无损检测技术 NDT TECHNIQUES

程序文件应包括：

——每种方法中的具体技术；

——针对附加培训和经验所应采取的措施；

——当为当前已获证人员引入新技术时，针对笔试及实操考试所应采取的措施。

The written practice shall include:

——the specific technique(s) within each method；

——the actions to be taken concerning additional training and experience；

——the written and practical testing, when additional techniques are introduced for a currently certified individual.

4.1.4 培训大纲 TRAINING OUTLINES

程序文件应参考或包括雇主所使用的无损检测培训大纲。如果由外部机构提供培训，责任 3 级人员应核查培训是否符合雇主要求。

The written practice shall reference or include the NDT training outlines used by the employer. If an outside agency is used to provide training, the Responsible Level 3 shall verify that the training meets the employer's requirements.

4.1.5 考试程序 EXAMINATION PRACTICES

程序文件中应包括：

——确定管理考试的个人或机构名称；

——规定考试的试题数量；

——明确所使用的视力检查方法；

——如有需要，应在程序文件中规定针对更新认证而进行的理论考试。

The written practice shall include:

——the designation of the individual(s) or organization(s) responsible for administering examinations；

——the number of examination questions to be administered；

——the specific visual acuity examination method to be used；

——If required, the use of a general examination for recertification shall be documented in the written practice.

4.1.6 管理 ADMINISTRATION

程序文件应包括负责管理和维护全部或部分雇主认证项目的个人或组织的名称。

The written practice shall include the identification of the individual(s) or organization(s) responsible for administering and maintaining all or part of the employer's certification program.

4.1.7 记录 RECORDS

程序文件应包括负责保存资格鉴定与认证记录的个人或组织的名称，以及此类记录的保存地点。

The written practice shall include the designation of the individual(s) or organization(s) responsible for maintaining the qualification and certification records and where such records shall be kept.

4.2 方法 METHODS

对于 1.2.3 中列出的常用方法，第 6 节和第 7 节详细说明了培训、实践经历和考试方面的最低要求。这些要求应被作为 1.2.3 中规定的其他方法的指南。

For the methods listed in 1.2.3, the minimum requirements for training, experience and examination are detailed in Sections 6 and 7. These requirements shall serve as a guideline for other methods as defined in 1.2.3.

4. 3 职责 RESPONSIBILITY

4. 3. 1 概述 GENERAL

雇主负责履行和遵守本文件要求并对人员资格进行认证。此外，总承包商应负责确保其分包商遵守本文件要求。使用外部机构的雇主应负责确保符合本文件中的相关要求。雇主仅负责对其雇员进行认证，而不能对其他雇主的雇员进行认证。个人不能对自己进行资格鉴定。如果个体经营者具备程序文件且已被其他按本文件认证的 3 级人员鉴定为符合本文件的要求，则其可进行自我认证。

The employer is responsible for the implementation of, and compliance with, This document and for certifying qualified personnel. In addition, the prime contractor shall be responsible for compliance to This document by their sub-contractors. Employers using outside agencies shall be responsible for assuring that the appropriate requirements of This document are met. The employer is solely responsible for the certification of its employees and cannot certify for another employer. Individuals cannot qualify themselves. Self-employed individuals may certify themselves provided they have a written practice and have been qualified to the requirements of This document by another individual certified to Level 3 in accordance with This document.

4. 3. 2 责任 3 级人员 RESPONSIBLE LEVEL 3

雇主应以书面形式指定一名“责任 3 级”人员，以代表其处理无损检测资格鉴定与认证过程方面的相关事宜。责任 3 级人员应：

——根据本文件的要求被认证为一种或多种无损检测方法的 3 级人员；

——应全面了解雇主所适用的工艺规程、法规、规范和标准；

——应熟知雇主所使用的材料、零部件、产品技术、无损检测方法及无损检测技术；

——保持对 NDT 培训和考试计划的全面控制和认知，包括指定或批准合格的主考人、教员和外部机构。

应书面形式确定和指定本文件定义的其他主考人，以覆盖雇主使用的所有检测方法。责任 3 级人员可来自外部机构，但在这种情况下，其仅可对人员进行资格鉴定，认证工作则由雇主负责。责任 3 级人员负责执行本文件，并全面负责人员资格鉴定与认证流程。

The employer shall identify in writing a “Responsible Level 3” to act on its behalf in matters regarding the NDT qualification and certification process. The Responsible Level 3 shall：

——Be certified in accordance with This document as a Level 3 in one(1) or more NDT methods；

——Have a thorough knowledge of the written instructions, codes, specifications and standards used by the employer.

——Have a thorough knowledge of the materials, components, product technologies, NDT methods and NDT techniques used by the employer； and

——Maintain overall control and cognizance over the NDT training and examination program,

including designating or approving qualified Examiners, instructors and outside agencies.

Additional Examiners as defined in This document shall be identified and delegated in writing as necessary to provide coverage for all methods used by the employer. The Responsible Level 3 may be an outside agency but in this case they can only qualify personnel, as only the employer can certify personnel. The Responsible Level 3 shall be responsible for implementation of This document and the overall administration of the qualification and certification program.

4. 3. 3 外部机构 OUTSIDE AGENCY

雇主可聘用外部机构根据本文件认证的 3 级人员来制定认证程序，担任责任 3 级人员职责，对无损检测人员进行考试或开展任何其他资格鉴定或履行 3 级人员职责。外部机构可进行资格鉴定，但不能进行认证。雇主应记录为满足本文件要求而选择的任何外部机构的适当性。该文件应足够详细，以证明外部机构有能力履行所需的 3 级人员职能。

An employer may use a Level 3 certified in accordance with This document from an outside agency to develop a certification program, act as the Responsible Level 3, examine NDT personnel or perform any other qualification or Level 3 function. An outside agency may qualify, but not certify personnel. The employer shall document the suitability of any outside agency selected to perform any function in meeting the requirements of This document. This documentation shall be of sufficient detail to justify the outside agency's ability to perform the required Level 3 function(s).

5 资格鉴定与认证等级 QUALIFICATION AND CERTIFICATION LEVELS

5. 1 概述 GENERAL

4 个基本认证等级为：有限 1 级、1 级、2 级和 3 级。雇主可对等级进行细分、增加或限制，但不应删减或降低每个等级的最低要求。如果雇主不使用所有等级，则应在雇主程序文件中明确所使用等级。如果实施了其他变更或细分，雇主程序文件中也应详细说明要求和责任。

如果无损检测人员未通过相应技术/方法的认证要求，则不应独立履行 5.3, 5.4, 5.5 和 5.6 中列出的职能。

The four basic levels of certification are Level 1-Limited, Level 1, Level 2 and Level 3. The employer may subdivide, add or limit levels as appropriate, but cannot eliminate or reduce the minimum requirements for each level. If the employer does not wish to use all of the levels, those levels to be used shall be documented in the employer's written practice. Where other variations or subdivisions are implemented, the requirements and responsibilities shall also be detailed in the employer's written practice.

NDT personnel shall not independently perform the functions listed in 5.3, 5.4, 5.5 and 5.6 if not certified to the appropriate level in the applicable technique/method.

5. 2 学员 TRAINEE

学员应指有文件证明参加过一种方法的培训课程，并且正处于被认证为有限 1 级、1 级或直接认证为 2 级的资格鉴定过程中的个人。在准备进行认证的方法领域，学员应：

- 有文件证明其为学员，并在规定的时间内积极参加了特定的培训课程。
- 在同一方法的 2 级或 3 级人员的直接观察下获得实践经历。
- 只有经责任 3 级人员批准后，才可在同方法的 1 级人员或教员直接观察下获得实践经历。
- 不能做出验收或拒收的决定。
- 不能独立进行检测。
- 不能独立履行任何其他无损检测职能。

An individual who is documented as participating in a training program within a method and is in the process of becoming qualified for certification to Level 1-Limited, Level 1 or directly to Level 2 shall be considered a trainee. In the method in which they are preparing for certification, trainees shall:

- Be documented as a trainee and be actively participating in a training program for a stated method for a limited and specified period of time.
- Obtain experience under the direct observation of a Level 2 or Level 3 in the same method.
- Obtain experience under the direct observation of a Level 1 in the same method, or instructor only when approved by the responsible Level 3.
- Not make accept or reject decisions.
- Not independently conduct tests.
- Not independently perform any other NDT function.

5.3 有限 1 级 LEVEL 1-LIMITED

附录 B 规定了有限 1 级的要求。

Appendix B defines the requirements for Level 1-Limited.

NANDTB-CN 不涉及有限 1 级人员资格鉴定。

NANDTB-CN does not involve qualification for Level 1-Limited.

5.4 1 级 LEVEL 1

对于所认证的方法和技术，1 级人员应：

- 能够遵守工艺卡要求；
- 具备按照经批准的工艺卡处理零件、记录结果与标定设备的技能和知识；
- 具备按照经批准的工艺卡在检测前后对零件进行任何必要的准备工作的技能和知识；
- 具备按照适用工艺标准要求进行系统性能检查的技能和知识；
- 必要时，接受相同方法的 2 级或 3 级持证人员的指导或监督；
- 当程序文件中有规定并经责任 3 级人员批准后，可根据经批准的工艺卡对特定产品或产品形式进行解释和评定，以进行验收或拒收。

In the method and technique in which certified, Level 1 individuals shall:

- Be able to follow work instructions;
- Have the skills and knowledge to process parts, document results and perform equipment standardization in accordance with approved work instructions;

- Have the skills and knowledge to carry out any necessary preparation of parts before or after testing in accordance with approved work instructions;
- Have the skills and knowledge to conduct system performance checks in accordance with the applicable process standard;
- Receive guidance or supervision from a certified Level 2 or Level 3 in that method when necessary;
- When specified in the written practice and approved by the Responsible Level 3, may perform interpretations and evaluations of specific product(s) or product form(s) for acceptance or rejection in accordance with approved work instructions.

5.5 2 级 LEVEL 2

对于所认证的方法和技术，2 级人员应：

- 具备设定和标定设备、处理零件、解释和评定、验收或拒收以及记录结果的技能和知识；
- 完全熟悉技术/方法的范围和局限性；
- 具备按照适用工艺标准要求进行系统性能检查的技能和知识；
- 能够为学员和 1 级人员提供必要的指导和/或监督；
- 熟悉控制雇主所用方法的法规、标准和其他合同文件；
- 当程序文件中有规定时，能够根据经批准的通用规程编制工艺卡。此类工艺卡应要求获得通过此方法认证的 3 级人员的最终批准；
- 具有相关产品制造和检验技术方面的基础知识；
- 当程序文件中有规定时，具备飞机或车辆维护方面的基础知识。

In the method and technique in which certified, Level 2 individuals shall:

- Have the skills and knowledge to set up and standardize equipment, process parts, interpret and evaluate for acceptance or rejection, and document results;
- Be thoroughly familiar with the scope and limitations of the technique/method;
- Have the skills and knowledge to conduct system performance checks in accordance with the applicable process standard;
- Be capable of providing the necessary guidance and/or supervision to trainees and Level 1 personnel;
- Be familiar with the codes, standards, and other contractual documents that control the method as used by the employer;
- When specified in the written practice, be capable of developing work instructions from approved general procedures. Such work instructions shall require final approval by a Level 3 certified in the method;
- Have a basic knowledge of relevant product manufacturing and inspection technology;
- When specified in the written practice, have a basic knowledge of aircraft or vehicle maintenance.

5.6 3 级 LEVEL 3

对于所认证的方法，3 级人员应：

- 具备解释控制无损检测方法的法规、标准和其他合同文件的技能和知识；
- 能够对无损检测机构和人员承担技术责任；
- 能够选择某项具体检测用的方法和技术；
- 能够编制和校核程序及工艺卡的充分性；
- 批准无损检测程序和工艺卡，以确保技术充分性；
- 对雇主所采用的其他无损检测方法、产品制造、相关工序和检测技术有一定的了解；
- 当程序文件中有规定时，具备飞机或车辆维护方面的基础知识。
- 能够提供或指导人员培训、考试和认证工作；
- 当实操考试中包含了零件验收和结果能力的熟练程度的证明要求时，通过进行无损检测来证明此能力；
- 当程序文件要求时，能够审核外部机构，以确保程序文件的要求得到满足。

In the method in which certified, Level 3 individuals shall:

- Have the skills and knowledge to interpret codes, standards, and other contractual documents that control the NDT method(s);
- Be capable of assuming technical responsibility for the NDT facility and staff;
- Be capable of selecting the method and technique for a specific test;
- Be capable of preparing and verifying the adequacy of procedures and work instructions;
- Approve NDT procedures and work instructions for technical adequacy;
- Have a general knowledge of other NDT methods, product manufacturing and their related sequencing,test technologies used by the employer;
- When specified in the written practice, have a basic knowledge of aircraft or vehicle maintenance;
- Be capable of providing or directing training, examination, and certification of personnel;
- Conduct NDT for the acceptance of parts and document the results if a demonstration of proficiency in this ability was included in the practical examination;
- When required by the written practice, be capable of auditing outside agencies to ensure the requirements of the written practice are met.

5.7 审核员 AUDITOR

执行无损检测技术审核、评审或评定的雇主人员应：

——由责任 3 级人员指定；

——接受过培训，并应具备理解所采用的无损检测工艺和程序方面的技能和知识。

——熟悉控制适用方法的相关法规、标准和其他合同文件。

Employer personnel performing technical NDT audits, surveys or assessments shall：

— Be designated by the Responsible Level 3;

— Have the training, skills, and knowledge to understand the processes and procedures utilized in the application of NDT processes.

— Be familiar with the applicable codes, standards, and other contractual documents that control the applicable method(s).

6 培训和实践经历 TRAINING AND EXPERIENCE

6.1 培训 TRAINING

6.1.1 概述 GENERAL

报考各个级别认证的报考人应完成足够的正式培训，以熟悉适用方法和技术的原理与实际操作，并且有能力履行第 5 节中规定的职责。正式培训应在上岗培训之前或是与上岗培训同时进行。所有已经完成的无损检测培训均应有书面记录。

针对指定的无损检测方法，表 1 和表 2 列出了 1 级和 2 级人员的最短培训学时。在未通过 2 级认证前不能获得 3 级认证。根据第 6.1.4 节和第 6.3.3 节的规定，培训和实践经历方面的等效性可由责任 3 级人员或主考人来确定，以获得 3 级认证。

对于目前已认证的射线检测的 3 级人员，需进行额外的 40 学时培训，方可实现胶片射线检测和非胶片射线检测的资格转换。

通常情况下，可从雇主或外部机构处获得基础、专业和实际操作培训，但雇主应补充提供在职培训。

Candidates for certification to all levels shall successfully complete sufficient formal training to become proficient with the principles and practices of the applicable method and technique(s) and be capable of carrying out the duties specified in Section 5. Formal training shall be conducted prior to, or in conjunction with, on-the-job training. All completed NDT training shall be documented

The minimum training hours for Level 1 and Level 2 are provided in Table I and Table II for the specified NDT methods. Individuals cannot certify to Level 3 without prior certification to Level 2 in the method. Military equivalency of training and experience can be determined by the Responsible Level 3 or Examiner in accordance with sections 6.1.4 and 6.3.3 for certification to Level 3.

Forty (40) additional hours of training is required for current certified Level 3 radiography personnel transitioning to either film or non-film radiography.

General, specific and practical training may be obtained with the employer or outside agency but shall always be supplemented by on-the-job training with the employer.

报考人应资格鉴定考试前，参加 NANDTB-CN 培训中心举办的正式培训，获得正式培训记录证明以确保满足本文件规定的培训学时。

Before taking the qualification examination, applicants should participate in the formal training organized by the NANDTB-CN Training Center and obtain a formal training record certificate to ensure that they meet the training hours specified in this document.

表 1 1 级和 2 级的最短正式培训学时

	1 级	2 级(先前通过了 1 级认证)	2 级(先前未通过 1 级认证)
PT	16	16	32
MT	16	16	32
ST	20	20	40
IRT	20	40	60
ET	40	40	80
UT	40	40	80

RT(胶片或非胶片)	40	40	80
RT(胶片和非胶片)	60	60	120

TABLE 1 MINIMUM FORMAL TRAINING HOURS FOR LEVEL 1 & LEVEL 2

	Level 1	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	16	16	32
MT	16	16	32
ST	20	20	40
IRT	20	40	60
ET	40	40	80
UT	40	40	80
RT Film or Non-Film	40	40	80
RT Film & Non-Film	60	60	120

表 2 从胶片射线检测到非胶片射线检测转换所需的正式培训学时

额外的正式培训学时		
1 级	2 级	1 级转 2 级(胶片和非胶片)
20	40	80

TABLE 2 RT FORMAL TRAINING HOURS FOR TRANSITION TO FILM AND NON-FILM

Additional Formal Training Hours		
Current Level 1	Current Level 2	Current Level 1 to Level 2 Film & Non-Film
20	40	80

6.1.2 培训大纲 TRAINING OUTLINES

所有培训均应按照责任 3 级人员或主考人批准的详细大纲来进行。大纲应包括作为培训材料出处的参考文献清单。培训内容至少应包括：

- 基础理论；
- 检测原则，包括无损检测方法的选择、与不同材料和零件的相关性以及检测参数；
- 产品形式和材料；缺陷形状和特征；
- 设备操作和标定；
- 工艺控制的重要性；
- 工艺相关步骤和参数的重要性；
- 安全事项；
- 适用技术及其优缺点；
- 每种方法和技术的局限性和能力；
- 适用规范、法规、操作程序和工艺卡；
- 检测结果的评定、解释和记录(如适用)。

如果由外部机构提供培训，责任 3 级人员应验证培训是否符合雇主要求。

All training shall be conducted in accordance with a detailed outline approved by the Responsible Level 3 or Examiner. The outline shall include a list of references from which the training material is

derived. As a minimum the training shall include:

- Basic theory;
- Test principles, including choice of NDT methods, relevance to different materials and part and test variables;
- Product forms and materials; defect formation and characterization;
- Equipment operation and standardization;
- The importance of process controls;
- The importance of appropriate processing steps and parameters;
- Safety regulations;
- Applicable techniques and the advantages and disadvantages of each;
- Limitations and capabilities of each method and technique;
- Applicable specifications, codes, operating procedures and work instructions;
- If applicable, evaluation, interpretation and documentation of test results.

If an outside agency is used to provide training, the Responsible Level 3 shall verify that the training meets the employer's requirements.

NANDTB-CN 培训大纲在官方网站上予以公布。

The training syllabus for NANDTB-CN has been published on the official website.

6.1.3 前期培训 PREVIOUS TRAINING

经过前期培训的人员或培训后 12 个月内未进行资格鉴定的人员必须重新培训。前期培训应有书面记录，以便雇主验收。重新培训至少应包括产品、设备设定、操作和标定、具体操作程序、适用技术、无损检测结果的解释和评定、安全及适用法规、标准和规范。前期培训证明可以不是原始记录，前提是责任 3 级人员或主考人认可前期培训的充分性和等效性。

For personnel credited with previous training, or personnel not certified within twelve (12) months of their training, refresher training must be provided. Previous training must be documented to be accepted by the employer. As a minimum, refresher training shall cover：

——products；
——equipment set-up；
——operation and standardization；
——specific operating procedures；
——applicable techniques；
——interpretation and evaluation of NDT results；
——safety；
——applicable codes, standards and specifications.

For documentation of previous training, records other than original records may be accepted if adequacy and equivalency have been determined to be acceptable by the Responsible Level 3 or Examiner.

6.1.4 等效培训 EQUIVALENT TRAINING

对于前期根据 NAS410、EN4179 或其他认可的无损检测资格鉴定程序的人员，应由责任 3 级人员或主考人确定其前期培训的充分性或等效性是否符合表 1 和表 2 的要求并将其文件化。如适用，可接受全部或部分的前期培训学时。

For personnel previously certified under NAS410, EN 4179 or other recognized NDT qualification programs, the adequacy and equivalency of their previous training to the requirements of Table I and Table 2 shall be determined and documented by the Responsible Level 3 or Examiner. All or a portion of previous hours may be accepted as applicable.

6. 1. 5　健康与安全培训 HEALTH AND SAFETY TRAINING

应严格遵守与危险品、事故预防及安全操作规程有关的所有条例。应按照当地的法规和条例来确定相关安全培训要求。认证前，所有寻求射线照相检测资格鉴定的报考人都应了解有关电离辐射危害和安全要求知识，还应了解并遵守适用法律法规要求。

All regulations relating to hazardous substances, accident prevention and safe working practices shall be strictly adhered to. Safety-related training requirements shall be determined in accordance with local codes and regulations. Prior to certification, all candidates seeking radiography qualification shall have received instruction on the hazards and safety requirements associated with ionizing radiation and be knowledgeable of, and comply with, the applicable regulations and laws.

6. 2　培训和考试人员 TRAINING AND EXAMINATION PERSONNEL

6. 2. 1 主考人 EXAMINERS

必要时，责任 3 级人员应以书面形式指定或批准主考人。所有主考人均应按本文件规定进行认证。经责任 3 级人员决定并文件化后，主考人即可实施无损检测书面或实操考试的准备、管理和评分工作，并负责管理其已认证的方法的整个或部分资格鉴定过程。

When necessary, Examiners shall be designated or approved in writing by the Responsible Level 3.All Examiners shall be certified in accordance with This document. As determined and documented by the Responsible Level 3, an Examiner can prepare, administer and grade written or practical NDT examinations, and administer all or part of, the qualification process in the method in which they are certified.

NANDTB-CN 主考人名单在官方网站上予以公布。

The list of NANDTB-CN examiners will be published on the official website.

6. 2. 2　教员 INSTRUCTORS

教员应具备依据经批准的培训大纲来计划、组织和提供课堂培训与实践操作的技能和知识。教员应由责任 3 级人员或主考人指定或批准。若采用教员进行在职培训（OJT）方式，则应由责任 3 级人员指定教员负责。

Instructors shall have the skills and knowledge to plan, organize, and present classroom training and practical exercises in accordance with approved training outlines. Instructors shall be designated or approved by the Responsible Level 3 or Examiner.If Instructors are used to provide on-the-job training (OJT) they shall be designated to do so by the Responsible Level 3.

NANDTB-CN 教员名单在官方网站上予以公布。

The list of NANDTB-CN instructors is published on the official website.

6. 2. 3　外部机构 OUTSIDE AGENCIES

当启用外部机构时，外部机构应向雇主提供实施培训和考试的人员的姓名、资格鉴定证明和认证证明（如适用）材料。

When an outside agency is used, the outside agency shall provide the employer with the names, evidence of qualifications and, if applicable, evidence of certifications held by the personnel conducting the training and examination.

6. 3 实践经历 EXPERIENCE

6. 3. 1 概述 GENERAL

有限 1 级、1 级、2 级或 3 级认证的报考人应具备足够的实践经历，以确保能够履行所报告的认证级别的职责。实践经验应覆盖相应级别相关的技术、任务及职责。

1 级和 2 级的最低实践经历要求见表 3 和表 4 及 6.4.3 条款（如适用）。

根据书面规程要求，经验获取需由同一方法的 2 级或 3 级人员监督。经责任 3 级人员批准后，可由同方法的 1 级人员或指导员提供直接观察。对于学员的经验记录，应备有可查验的文件，注明人员姓名、日期、方法内活动描述、小时数以及提供直接观察的认证人员信息。

3 级的经验要求详见表 5 及 6.4.4（如适用）。作为满足表 5 经验要求的替代方案，报考人可通过能力认定的方式获得 3 级资格。

对于目前持有射线照相检测 3 级证书的人员，如果要在胶片射线照相检测与非胶片射线照相检测进行转换，则应满足在主考人、教员或外部机构的指导或监督下完成 240 小时附加实践经历的要求。

Candidates for certification to Level 1-Limited, Level 1, Level 2 or Level 3 shall have sufficient practical experience to assure that they are capable of performing the duties of the level for which certification is sought. Practical experience shall cover the relevant techniques, tasks, and duties at the appropriate level.

The minimum experience requirements for Level 1 and Level 2 are provided in Table 3 and Table 4 and 6.4.3, as applicable.

As documented in the written practice, experience shall be overseen by a Level 2 or Level 3 in the same method. A Level 1 or Instructor in the same method may provide direct observation when approved by the Responsible Level 3. For trainees gaining experience, documentation shall be available for review to indicate individual, date, description of activity within the method, hours, and certified personnel providing direct observation.

The experience requirements for Level 3 are in Table 5 and 6.4.4, as applicable.As an alternative to meeting the experience requirements of Table 5, the candidate(s) may qualify for Level 3 in a method via competency demonstration per Appendix D.

Additional experience requirements for current Level 3 radiography personnel transitioning to either film or non-film radiography are two hundred forty (240) hours with guidance or supervision from an examiner, instructor, or outside agency.

6. 3. 2 前期实践经历 PREVIOUS EXPERIENCE

只有当报考人的前期实践经历有文件记录，并且经过责任 3 级人员或主考人批准时，其从先前雇主那里获得的实践经历才能被现在的雇主接受。如适用，可接受全部或部分前期实践经历的小时数或积分。前期实践经历或积分证明可以不是原始记录，前提是责

任 3 级人员或主考人认可前期实践经历的充分性和等效性。

A candidate's experience may be accepted by the current employer only if such experience is documented and approved by the Responsible Level 3 or Examiner. All or a portion of previous hours or points may be accepted as applicable. For documentation of previous experience or points, records other than original records may be accepted if adequacy and equivalency have been determined to be acceptable by the Responsible Level 3 or Examiner.

6. 3. 3　等效实践经历 EQUIVALENT EXPERIENCE

对于先前根据 NAS410、EN4179 或其他认可的无损检测资格鉴定程序认证的人员，应由责任 3 级人员或主考人确定其前期实践经历培训的充分性或等效性是否符合表 3、表 4 或表 5 的要求并将其文件化。

For personnel previously certified under NAS410, EN 4179 or other recognized NDT qualification program, the adequacy and equivalency of their previous experience to the requirements of Table 3, Table 4, or Table 5 shall be determined and documented by the Responsible Level 3 or Examiner.

表 3. 1 级和 2 级的最低实践经历要求

	实践经历时间（小时）		
	1 级 （学员实践经历）	2 级 （先前通过了 1 级认证）	2 级 （先前未通过 1 级认证）
PT	130	270	400
MT	130	400	530
IRT	200	400	600
ST	200	400	600
ET	200	600	800
UT	200	600	800
RT 胶片或非胶片	200	600	800
RT 胶片和非胶片	220	780	1000

TABLE3 MINIMUM EXPERIENCE REQUIREMENTS FOR LEVEL 1 & LEVEL 2

	Experience time in hours		
	Level 1 (Trainee experience)	Level 2 with previous Level 1 certification	Level 2 without previous Level 1 certification
PT	130	270	400
MT	130	400	530
IRT	200	400	600
ST	200	400	600
ET	200	600	800
UT	200	600	800
RT Film or Non-Film	200	600	800
RT Film & Non- Film	220	780	1000

表 4　从胶片射线检测到非胶片射线检测转换所需的实践经历要求

额外的最短实践经历时间(小时)		
1 级	2 级	1 级转 2 级(胶片和非胶片)
20	200	800

TABLE 4 RT EXPERIENCE REQUIREMENTS FOR TRANSITION TO FILM AND NON-FILM

Additional Minimum Experience Time in Hours		
Current Level 1	Current Level 2	Current Level 1 to Level 2 Film & Non-Film
20	200	800

表 5. 常用方法中 3 级的最低实践经历要求

学院或大学	2 级的实践经历要求
无 None	4 年
成功完成在技校、学院或大学的两年工程或物理科学学习经历 Successful completion of Two years of engineering or physical science study at a technical school, college or university	2 年
3~4 年工程或物理科学本科学习经历 3-4 year physical science or engineering undergraduate degree	1 年

TABLE 5 MINIMUM EXPERIENCE REQUIREMENTS FOR LEVEL 3 IN COMMON METHODS

College or University	Level 2 Experience
None	4 years
Successful completion of two years of engineering or physical science study at a technical school, college or university	2 years
3-4 year physical science or engineering undergraduate degree	1 year

6. 4 其他无损检测方法 Other NDT METHODS

6. 4. 1 概述 General

其他方法的人员培训、经验及考核要求应依据 6.4 条款制定，并由雇主予以记录。

The requirements for personnel training, experience, and examination for these other methods shall be established in accordance with 6.4 and shall be documented by the employer.

6. 4. 2 最短小时数 MINIMUM HOURS

对于表 1、表 3 或 1.2.3 条款中未列出的雇主所采用方法的最低培训学时和实践经历小时数，应由责任 3 级人员来确定。

The minimum required training and experience hours for methods used by the employer in Table 1, Table 3, or bulleted in 1.2.3 shall be established by the Responsible Level 3.

6. 4. 3 1 级和 2 级 LEVELS 1 AND 2

当确定表 1 和表 3 中未列出的其他方法的培训学时和实践经历小时数时，最短小时数应基于表 1 和表 3 所列的复杂程度类似的方法的要求。此规定不适用于 1.2.3 条款中列出的方法。

When determining training or experience hours for other methods not listed in Tables I and 3, the minimum hours shall be based on the requirements for a method of similar complexity listed in Table I and 3. This excludes those methods bulleted in 1.2.3.

6. 4. 4 3 级 LEVEL 3

当经认可的工程组织批准并经雇主程序文件授权后，雇主可对 1.2.3 中未列出的其他无损检测方法的首个 3 级人员进行资格鉴定与认证，前提是：

- 报考人具备履行 5.6 中的 3 级人员职责的技能和能力；
- 满足表 6 中的所有要求。

When approved by the cognizant engineering organization and authorized by the employer's written practice, an employer may qualify and certify its first Level 3 in other NDT method not bulleted in 1.2.3 provided:

- The candidate has the skill and ability to carry out the Level 3 responsibilities in 5.6;
- All of the requirements in Table 6 are met.

表 6. 无损检测新方法中的首个 3 级人员的最低要求

学院或大学	授课/学习	实践经历	其他无损检测认证
没有在技校、学院或大学进行两年工程或科学学习	80 小时	300 小时	先前至少获得一个 3 级证书或两个 2 级证书
成功完成在技校、学院或大学两年工程或物理科学学习经历	60 小时	200 小时	先前至少获得一个 3 级证书或两个 2 级证书
3~4 年工程或物理科学本科学习经历	40 小时	200 小时	先前至少获得一个 2 级证书

TABLE 6 MINIMUM REQUIREMENTS FOR FIRST LEVEL 3 IN AN OTHER NDT METHOD

College or University	Instruction/ Study	Experience	Other NDT Certifications
No engineering or science study at a technical school, college or university	80 hours	300 hours	At least one previous Level 3 or two Level 2 certifications held
Successful completion of two years of engineering or physical science study program at a technical school, college or university	60 hours	200 hours	At least one previous Level 3 or two Level 2 certifications held
3-4 year physical science or engineering undergraduate degree	40 hours	200 hours	At least one previous Level 2 certification held

7 考试 EXAMINATIONS

7. 1 目的 PURPOSE

7. 1. 1 概述 GENERAL

为核实报考人的技术资格鉴定而进行的考试应包括基础考试（仅 3 级）以及针对报考人认证的每种方法进行的理论考试、专业考试和实操考试。

专业考试应在符合表 3 的至少 75%的要求后进行。在进行实操考试前，表 3 要求应全部得到满足。报考人首次认证前还应进行视力检查，此后定期进行这一检查。

报考人应仅可在考试期间接触试题和试件。不应对笔试试题进行口头翻译。

Examinations to verify the technical qualifications of candidates shall consist of a basic examination(Level 3 only)and for each method , a general, specific, and practical examinations in which the candidate is to be certified.

The specific examination shall be administered after a minimum of 75% of Table 3 requirements have been completed. Table 3 requirements shall be complete prior to administration of practical examination. An examination for visual acuity shall also be conducted prior to the candidate's first certification and periodically thereafter.

Examinations and test samples shall be made available to the candidates only during administration of the examinations. Verbal translation of written examinations shall not be permitted.

7. 1. 2 视力检查 VISION EXAMINATION

所有等级的视力检查均应确保申请人的近距离视力和色觉符合表 7 的要求。视力要求不适用于教员或审核员。近距离视力测验应每年进行一次，色觉测验应至少每 5 年进

行一次。

雇主应确保将表 7 的视力要求传达给所有相关人员和/或机构。斯奈伦（Snellen）和耶格（Jaeger）视力测验应由责任 3 级人员指定的经过培训的人员或有资质的医务人员来负责。当需要进行视力矫正方可通过视力检查时，应在所有检测/检验过程中佩戴视力矫正器。认证前，色觉方面的任何局限性均应经过责任 3 级人员评估，并且必须以书面形式得到批准。在任何可能影响视力的身体状况或手术后，应通知责任 3 级人员，并应对该人员进行重新检查以验证其仍满足表 7 的要求。

The vision examination for all levels shall assure that the applicant's near vision and color perception meet the requirements of Table 7. Vision requirements do not apply to instructors or auditors. Near vision tests shall be administered annually and color perception tests shall be administered at least every 5 years.

The employer shall ensure the flow-down of the Table V vision requirements to all necessary personnel and/or facilities. Snellen and Jaeger tests shall be administered by trained personnel designated by the Responsible Level 3 or by qualified medical personnel. When vision correction is necessary to pass the visual acuity exam, vision correction shall be worn during all testing/inspections. Any limitations in color perception shall be evaluated by the Responsible Level 3 prior to certification and must be approved in writing.After any condition or procedure that could affect vision, the Responsible Level 3 shall be notified, and the individual shall be re-examined to verify they meet the requirements of Table 7.

表 7 视力要求

考试要求	
近距视力（至少选其一）	用单眼裸视或矫正视力符合： •ISO 18490：2015 的 E 视力表 •斯内伦视力 20/25，距离 16 英寸（40.64 厘米）+/-1 英寸（2.54 厘米）* •Jaeger 视力 1 号字，距离不小于 12 英寸（30.48 厘米）*
辨色能力	应该能充分辨别和区分应用于程序中的颜色
*至少一只眼睛为自然视力或矫正视力。不允许模拟视力测试和远距离测试。	

TABLE 7: VISION REQUIREMENTS

Examination Requirements	
Near Vision Options (Select One Minimum)	• Tumbling E in accordance with ISO 18490:2015 • 20/25 (Snellen) at 16" (40.64 cm)) +/- 1" (2.54 cm)* • Jaeger No. 1 at not less than 12" (30.48 cm) *
Color Perception	Personnel shall be capable of adequately distinguishing and differentiating colors used in the process involved
*In at least one eye, natural or corrected. Simulated vision test and distance is not permitted.	

7. 1. 3 基础考试 Basic Examination

首次申请 3 级资格鉴定应参加基础考试。基础考试包含以下三个部分：

—— 每种检测方法至少十道闭卷考题，涵盖责任 3 级人员根据第 1.2.3 节选定的至少四种无损检测方法（须包含雇主实际采用的无损检测方法；具体检测方法的选定方式可由责任 3 级人员或国家航空航天无损检测委员会确定）；

—— 至少十道涉及材料与制造工艺的闭卷考题；

—— 至少十道涉及 NAS410/EN 4179 标准要求的开卷考题。

基础考试每个部分的合格分数均为 80%。此考试是参加认证考试的前提条件，其成绩不计入认证考试总评分。

通过基础考试是所有 3 级报考人的前提，且必须在进行方法认证前完成。每位 3 级申请者仅需参加一次基础考试，后续认证其他方法时无需重复考试。若申请者提交当前有效的 ASNT、ISO 9712 或 NANDTB 的 3 级资格鉴定证明作为基础考试等效依据，则须额外参加涵盖 NAS410/EN 4179 标准要求的补充考试。

For initial Level 3 qualification, a basic examination is required. The basic examination shall consist of the following three (3) sections:

— A minimum of ten (10) closed book questions per method, covering at least four (4) NDT methods chosen by the Responsible Level 3 from Section 1.2.3, including the employer-used NDT methods (the Responsible Level 3 or NANDTB may define how methods are selected for examination);

— A minimum of ten (10) closed book questions covering materials and manufacturing processes;

— A minimum of ten (10) open book questions covering NAS410/EN 4179 requirements.

The minimum score shall be 80% for each section of the Basic examination. The Basic examination is a prerequisite to certification examinations and scores shall not be factored into the certification examination composite score.

Passing a Basic examination is a prerequisite for any Level 3 candidate and shall be completed prior to method certification. Only one (1) basic examination is required per Level 3 candidate and need not be repeated for each method certified. When a current Level 3 ASNT, ISO 9712, or NANDTB qualification is submitted as evidence of a basic examination, a supplemental examination covering the NAS410/EN 4179 requirements shall be administered.

NANDTB-CN 基础（综合）考试的试题数量规定为 100 题，其中 NAS410/EN4179 标准 20 题、材料工艺缺陷知识 30 题、5 种常规方法各 10 题共 50 题（雇主涉及其他无损检测方法时另行增加）。

The number of questions for the NANDTB-CN basic examination is set at 100. This includes 20 questions based on the NAS410/EN4179 standard, 30 questions on material process defects, and 50 questions covering 5 conventional methods, with 10 questions for each method (additional questions may be added if the employer involves other non-destructive testing methods).

7.1.4 理论考试 GENERAL EXAMINATION

理论考试应为涵盖了相应等级的相关方法的闭卷考试。1 级、2 级或 3 级的理论考试的试题数量应至少为 40 道。

如果雇主程序文件中有规定，则报考人持有有效的相应等级和方法的 ASNT、ISO9712 或 NANDTB 资格鉴定证书可被作为达到理论考试要求的证据。

The general examination shall be a closed book examination covering the cross-section of the applicable method at the appropriate level. A minimum of 40 questions shall be administered for the general examination at Levels 1, 2 or 3.

Possession of a current ASNT, ISO 9712, or NANDTB qualification at the appropriate level and method by the candidate may be satisfactory evidence that the general examination requirement is satisfied as defined in the employer's written practice.

NANDTB-CN 理论考试的试题数量规定为 50 题。持有有效的相应等级和方法的正规机

构颁发的 ASNT、ISO9712、GB/T 9445、GB/T 36439 或其他国家 NANDTB 证书可以免考理论考试。

The number of questions for the NANDTB-CN general examination is set at 50. Holders of valid ASNT, ISO9712, GB/T 9445, GB/T 36439, or other national NANDTB certificates issued by recognized institutions for the corresponding level and method may be exempted from the general examination.

7.1.5 专业考试 SPECIFIC EXAMINATION

专业考试应为涵盖了报考人在履行其与雇主的职责时可能使用的规范、法规、标准、设备、操作程序、产品知识和检测技术方面的要求及用途的开卷考试。

1 级、2 级和 3 级的专业考试的试题数量应至少为 30 题。

应提供由责任 3 级人员或主考人确定的参考资料，如规范、表格、公式等。使用此类资料的问题应要求理解其中所含信息，而不仅仅是在参考资料中找到答案。对于非问答题，选择题的选项不得少于 3 个。判断题则应设置解释说明。

The specific examination shall be an open book examination covering the requirements and use of the specifications, codes, standards, equipment, operating procedures, product knowledge, and test techniques the candidate may use in the performance of their duties with the employer.

A minimum of 30 questions shall be administered for the specific examination at Levels 1, 2, and 3.

Reference material, as determined by the Responsible Level 3 or Examiner, such as specifications, tables, formulas, etc. shall be provided. Questions utilizing such material shall require understanding of the information contained therein rather than merely finding its location.Questions without a written answer shall have a minimum of three (3) multiple choice answers. True/False questions shall include an explanation portion to each question.

NANDTB-CN 专业考试的试题数量规定为 40 题，产品知识和方法标准一般为选择题，验收标准一般为判断题，需说明理由。雇主涉及其他标准规范时，另行安排雇主规范考试，每个规范不少于 5 题。

The number of questions for the NANDTB-CN professional examination is set at 40. Product knowledge and method standards are generally multiple-choice questions, while acceptance standards are generally true-false questions, requiring reasons to be provided. When employers involve other standards and specifications, separate employer-specific standard examinations are arranged, with no fewer than 5 questions for each specification.

7.1.6 实操考试 PRACTICAL EXAMINATION

实操考试应包括考核报考人在履行职责时，对所进行的典型任务的熟练程度。如果既要求报考人演示其对某种工艺的熟练程度，又要求其解释结果，则应使用实物试件。

报考人不应知晓试件和其中存在的不连续的位置。如果仅要求报考人解释结果，而不需要执行形成图像的检测过程，则考试试件可以是图像，如射线底片或得到的检测数据。责任 3 级人员或主考人应编制并填写涵盖了下列各小段所述主题的书面检查表，以确保充分覆盖相关内容并有助于考试的管理和评分。

除使用检查表外，责任 3 级人员或主考人应确定如何记录报考人获得的考试结果并将其文件化（例如零件图、图纸、草图、书面说明等）。所有此类文件均应成为考试记

录的一部分并予以归档。

The practical examination shall consist of a demonstration of proficiency in performing tasks that are typical of those to be accomplished in the performance of the candidate's duties. If the candidate is required to demonstrate proficiency in the application of the process as well as interpretation of results, hardware test samples shall be used.

The candidate shall not be familiar with the test samples and the location of the discontinuities located therein. If the candidate is only required to interpret the results and not perform the process of generating the image, the test samples may be images, such as radiographs or other resultant test data. A written checklist covering the topics detailed in the following sub-paragraphs shall be developed and completed by the Responsible Level 3 or Examiner to assure adequate coverage and to assist in the administration and grading of the examination.

In addition to using the checklist, the Responsible Level 3 or Examiner shall determine and document how the examination results obtained by the candidate are to be documented (e.g. part maps, drawings, sketches, written descriptions, etc.). All such documentation shall become part of the examination and filed accordingly.

NANDTB-CN 实操考试分为工艺考试和操作考试两个部分。

The NANDTB-CN practical examination is divided into two parts: process examination and operation examination.

7.1.6.1 有限 1 级 LEVEL 1-LIMITED

附录 B 规定了有限 1 级的要求。

Appendix B defines requirements for Level 1-Limited.

7.1.6.2 1 级 LEVEL 1

对于每种方法，报考人应按照工艺卡要求来处理至少 2 个不同构造的试件，以证明其熟练程度；对于其中认证的每种技术，需处理至少 1 个试件。当所认证的方法仅需要检测一种构造的零件时，2 个试件的构造可以相同。

试件应符合 3.39 的定义，并应代表报考人在履行其与雇主的职责时遇到的产品。如果责任 3 级人员批准其验收或拒收产品，则报考人应解释并记录试件的检测结果。

检查表中应包括设备和材料使用及标定方面的熟练程度、对程序细节的遵守情况；如适用，还应包括在显示的解释与评定方面的熟练程度。

The candidate shall demonstrate proficiency by using a work instruction to process at least two (2) test samples of differing configurations for each method, with at least one(1) test sample for each technique for which certification is sought. When only one(1) configuration of hardware is to be inspected upon certification, both test samples may be of the same configuration.

The test samples shall meet the definition in 3.39 and shall be representative of the products to be encountered by the candidate in the performance of their duties with the employer. If approval to accept or reject hardware is to be granted by the Responsible Level 3, the candidate shall interpret and document the results of the inspection of the test samples.

The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details and, if applicable proficiency in the interpretation and evaluation of indications.

7.1.6.3 2 级 LEVEL 2

对于每种方法，报考人应通过处理至少 2 个不同结构的试件来证明其熟练程度；对于其中认证的每种技术，需处理至少 1 个试件。当所认证的方法仅需要检测一种结构的硬件或产品时，2 个试件的结构可以相同。

试件应符合 3.39 的定义，并应代表报考人在履行其与雇主的职责时遇到的产品。除了至少两个含有已知且有记录的不连续的试件外，还可以增加没有不连续的试件。报考人应按照适用验收标准要求来记录无损检测结果。检查表中应包括设备和材料使用及标定方面的熟练程度、对程序细节的遵守情况；如适用，还应包括显示的解释与评定的准确性和完整性。

The candidate shall demonstrate proficiency by inspecting at least 2 test samples of differing configurations for each method, with at least one test sample for each technique for which certification is sought. When only one configuration of hardware or product is to be inspected upon certification, both test samples may be of the same configuration.

The test samples shall meet the definition in 3.39 and shall be representative of the products to be encountered by the candidate in the performance of their duties with the employer. In addition to the two (2) minimum known and documented test samples with discontinuities, specimens without discontinuities may be included. The candidate shall document the NDT results in accordance with the applicable acceptance criteria.

The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details, the accuracy and completeness of interpretation and evaluation of indications.

7.1.6.4　3 级 LEVEL 3

报考人应通过编制符合雇主当前所用方法要求的无损检测工艺规程或工艺卡来证明其熟练程度。如适用，应结合认证或更新认证所需的理论考试和/或专业考试要求来编制工艺规程或工艺卡。应将实操考试的结果文件化，并且使用检查表来判定报考人编制的工艺规程或书面说明的技术准确性、技术内容和清晰度。当报考人的职责包括处理和/或验收或拒绝产品时，则应通过进行与 7.1.6.3 中的 2 级相当的实操考试来证明可熟练执行此类任务。

The candidate shall demonstrate proficiency by preparing an NDT procedure or work instruction appropriate to the employer's current requirements for the method. The procedure or work instruction shall be developed in conjunction with the general and/or specific examination(s) required for certification or recertification, as applicable.

The results of the practical examination shall be documented, and a checklist shall be used to address the technical accuracy, technical content, and clarity of the procedures or written instructions prepared by the candidate.

When the candidate's duties will include processing and/or acceptance or rejection of products, proficiency in performing such tasks shall be demonstrated by a hands-on practical examination equivalent to Level 2 in accordance with 7.1.6.3.

7. 2 考试管理 ADMINISTRATION OF EXAMINATIONS

7. 2. 1 概述 GENERAL

所有考试的管理和评分均应由责任 3 级人员或主考人来负责,其中任一必须获证于相关方法。责任 3 级人员或主考人可通过书面形式委托非主考人来协助进行考试的管理及选择题的评分。

问答题与填空题必须由责任 3 级人员或主考人来评估，以核查报考人对试题内容理解的充分性。在任何情况下，考试管理工作均不应由报考人本人或其下属来进行。

The administration and grading of all examinations shall be the responsibility of the Responsible Level 3 or Examiner, either of which shall be certified in the applicable method. The Responsible Level 3 or Examiner may delegate in writing the administration and grading of examinations using multiple choice questions to non-Examiner personnel.

Responses to essay and fill-in questions must be evaluated by the Responsible Level 3 or Examiner to verify the candidate's adequate understanding of the subject matter. In no case can an examination be administered by one's self or by a subordinate.

7. 2. 2 外部机构管理 ADMINISTRATION BY AN OUTSIDE AGENCY

当由外部机构来管理考试时，雇主应确保参与考试管理的所有人员均符合本文件的要求。在任何情况下，遵守本文件的最终责任应由雇主来承担。

When an outside agency is used to administer examinations, the employer shall ensure that all individuals involved in the administration of the examinations meet the requirements of This document. In all cases, the ultimate responsibility for compliance to This document shall remain with the employer.

7. 2. 3 成绩 SCORING

进行认证时，报考人应在每科独立考试中获得至少 70 分（百分制）。另外，报考人应在实操考试中检测出由 3 级人员规定的所有不连续、缺陷或状态，并至少获得 70 分（百分制）。

报考人的平均得分应不低于 80 分（百分制），方可通过认证。在计算平均分时，所有考试分数所占的权重应相同。举例说明，如果在进行更新认证时仅进行了专业考试和实操考试，则这些分数应被记入平均分。如果更新认证时还进行了理论考试，则理论考试分数也应被记入平均分。

若持 ASNT、NANDTB 或 ISO9712 无损检测证书，且该证书采用“通过/未通过”评分制，并且替代了按照 7.1.4 要求的理论考试，则其成绩分值应按 80%计算。对于依据附录 A 重新认证的 3 级人员，应在认证记录中添加相应标注，且无需评定具体分数。若按附录 A 要求同时进行了实操考试，则实操考试的最低通过分数应为 80%。

The candidate for certification must achieve a minimum score of 70% on each individual examination. In addition, the candidate must detect all discontinuities, flaws or conditions specified by the Level 3 during the practical examination and achieve a minimum score of 70%.

The candidate shall have an average score of no less than 80% in order to be eligible for certification. All examination scores shall be of equal weight in determining the average score. For

example, if only specific and practical examinations are administered for recertification, only those scores shall be factored into the average score. If a general examination is also given for recertification, the general score shall also be factored into the average score.

Scores for ASNT, NANDTB, or ISO 9712 NDT certificates scored as “pass/fail” and used in lieu of the general examination per 7.1.4 shall be assigned a value of 80%.For Level 3 personnel recertified using Appendix A, a notation in the certification record shall be applied and a score value need not be assigned. If a hands-on practical is administered in conjunction with Appendix A, then a minimum passing score of 80% is required for the practical examination.

NANDTB-CN 考试科目包括：基础考试、理论考试、专业考试、雇主考试、工艺考试、操作考试。基础考试不低于 80%，其他每科不低于 70%，平均分不低于 80%为合格。

平均成绩的计算为理论考试、专业考试和实操考试 3 项的平均分，如复证或其他情况根据实际所考科目取平均分。当有雇主考试时，专业考试成绩为专业考试和雇主考试平均分。实操考试成绩为工艺考试和操作考试的平均分。

The NANDTB-CN examination subjects include: basic examination, general examination, professional examination, employer examination, process examination, and operation examination. To pass, the basic examination score must be no less than 80%, and for each of the other subjects, the score must be no less than 70%. The average score must also be no less than 80%.

The average score is calculated as the average of three items: general examination, professional examination, and practical examination. In cases of recertification or other situations, the average score is calculated based on the actual subjects tested. When there is an employer-organized examination, the score for the professional examination is the average of the professional examination and the employer-organized examination. The score for the practical examination is the average of the process examination and the operation examination.

7. 2. 4　补考 RE-EXAMINATION

对于未通过任何基础考试（仅 3 级）、理论考试、专业考试和实操考试的报考人，应在补考前接受由责任 3 级人员或主考人确定和记录的补充培训。

补充培训应有文件记录，并且应涉及报考人所欠缺的技能或知识。补考试题或试件不应与上次考试所用的相同。

补考试题必须包括至少 25%的新试题。如果未通过更新认证考试，则现有证书应被暂停。

补考应在程序文件规定的时限内进行，且不得超过 6 个月。程序文件中应规定最多允许的补考次数。

Candidates failing any basic (Level 3 only), general, specific and practical examination shall receive additional training as determined and documented by the Responsible Level 3 or Examiner before attempting re-examination of the failed exam.

The additional training shall be documented and shall address those areas found deficient in the candidate's skills or knowledge.

The re-examination shall not use the same written tests or test samples that were used in the failed examination.

The re-examination test must contain a minimum of 25% new questions. A current certification shall be suspended if an individual fails an examination for recertification.

Re-examination shall be taken within a timeframe specified in the written practice but shall be no longer than six (6)months. The maximum number of re-examinations shall be specified in the written practice.

NANDTB-CN 规定补考时限应在 6 个月内且不超过 3 次，否则需重新申请资格鉴定考试。补考的人员应参加补充培训并获得补充培训记录证明后参加补考。

The NANDTB-CN regulations stipulate that the time limit for re-examination should be within 6 months and not exceed 3 times, otherwise a new application for qualification examination is required. Candidates for re-examination should participate in supplementary training and obtain a certificate of supplementary training record before taking the re-examination.

8 认证 CERTIFICATION

8.1 概述 GENERAL

经证明具备相关资格的人员可获得雇主按照其程序文件要求进行的认证。学员、教员、无损检测审核员或使用直读式仪器作专项检测的人员不需要进行认证。

对于部分或全部自动化设备，必须由持有该方法 3 级认证的人员对检测流程的各环节逐一评估，以判定正确执行这些环节是否需要特定的无损检测知识和技能。对于经判定需要特定无损检测知识和技能的作业，相关人员必须根据本标准要求取得相应级别的认证。

Personnel who have demonstrated that they possess the appropriate qualifications are eligible for certification by their employer in accordance with the employer's written practice. Certification is not required for trainees, instructors, NDT auditors, or personnel performing specialized inspections using direct readout instruments.

Partially or fully automated equipment requires a Level 3 certified in the method to consider each part of the inspection processes and establish whether specific NDT knowledge and skills are required to correctly carry them out. Certification to this document, at the appropriate level, is required for the tasks determined to require specific NDT knowledge and skills.

8.2 记录 RECORDS

8.2.1 最低要求 MINIMUM REQUIREMENTS

在证书有效期内，雇主应保存人员认证记录。雇主保存的记录应至少包括：

a）持证人姓名；

b）人员认证等级、方法和（或）技术（如适用）；

c）最近一次参加的笔试和实操考试和实操检查表，以及前一次考试的成绩；

d）当采用了附录 A，则记录 3 级人员更新认证的积分文档。无需保留最近一次笔试和实操考试成绩；

e）当采用了附录 D，则记录 3 级人员获得 3 级认证资格的积分文档；

f）当前认证的日期和有效期。对于已暂停或撤销的认证，应记录理由和日期。如适用，还应记录恢复认证的日期和措施；

g）无损检测培训历史记录，包括培训单位、培训类型、培训日期和课时数，以及6.1.3 和 6.1.4 所要求的文件（如适用）；

h）无损检测实践经历，包括当前雇主和以前雇主的足以证明满足认证的实践经历要求的任何认证记录，以及 6.3.2 和 6.3.3 所要求的文件（如适用）；

i）最近(也就是当前)的视力和色觉检查结果；

j）满足资格鉴定要求的正式教育的程度和文件证明；

k）授权认证的雇主代表的姓名和签字；

l）最近的年度熟练程度评审结果。

The employer shall maintain personnel certification records as long as the certification is in effect. The records maintained by the employer shall include, as a minimum:

a) Name of the certified individual;

b) Level, method, and/or technique as applicable, for which individual is certified;

c) The latest written and practical examinations and practical checklist, and the scores from the immediately previous exams;

d) When Appendix A is used, documentation of credit points used for Level 3 recertification. Last written and practical examinations need not be maintained;

e) When Appendix D is used, documentation of accrued points used for eligibility of Level 3 certification;

f) Date and expiration of current certification(s). Suspended or revoked certification(s) shall be documented for reason and date. If applicable, date and action to reinstate certification(s) shall also be documented;

g) NDT training history that identifies the source, type of training, dates of training and course hours, and, if applicable, the documentation required by 6.1.3 and 6.1.4;

h) NDT experience history, including any previous certifications, both with current and previous employers sufficient to justify satisfaction of experience requirements for qualification, and, if applicable, the documentation required by 6.3.2 and 6.3.3;

i) Results of the most-recent (i.e. current) visual acuity and color perception examinations;

j) Extent and documentation of formal education when used to meet qualification requirements;

j) The name and signature of the employer's representative authorizing the certification;

k) Results of most recent annual proficiency review.

8. 2. 2 记录的可获得性 RECORD AVAILABILITY

应按照雇主程序文件要求来保存所有培训、资格鉴定与认证记录，以备审核。当启用了 NANDTB 时，见附录 C。

除实际考试外，所有培训、资格鉴定与认证记录均应在员工有要求时，或是以任何原因离开公司时提供给相关员工。

All training, qualification, and certification records shall be maintained in accordance with the employer's written practice and shall be made available for audit. When an NANDTB is used, see Appendix C.

All training, qualification, and certification records, except for actual examinations, shall be made available to the applicable employee upon request or upon leaving the company for any reason.

8.3 证书失效 LOSS OF CERTIFICATION

8.3.1 过期 EXPIRATION

当在认证间隔内未进行更新认证时，认证应被视为失效。认证、年度熟练程度评审和视力检查的过期时间为此事件发生的对应月份的月底。

Certifications shall expire when the certification interval has lapsed with no recertification issued. Certification, annual proficiency review, and vision examinations are considered to expire at the end of the corresponding month in which the event began.

8.3.2 暂停 SUSPENSION

在下列情况下应暂停认证：

- 视力检查结果过期；
- 连续超过 12 个月未从事所认证的检测方法；
- 未通过更新认证考试；
- 在人员工作能力方面发现存在欠缺；
- 年度熟练程度评审有效期满。

Certification shall be suspended when:

- Vision examination is expired;
- Individual does not perform in the method certified for at least 12 consecutive months;
- Individual fails recertification examination;
- Individual's performance is found to be deficient in any manner;
- Annual proficiency review is expired.

8.3.3 撤销 REVOCATION

当连续超过 24 个月没有用所认证的检测方法为雇主工作、雇佣关系终止、或是发现其存在技术能力不足的行为时，认证应被撤销。当某人在 24 个月内被原雇主重新雇佣时，则可视为暂停认证。所有认证将在个人行为被认定为不道德情形下被撤销。

Certification shall be revoked when the individual does not perform in the certified method for the employer for at least 24 consecutive months, when employment has been terminated, or when the individual’s conduct is found to be technically incompetent. When an individual is re-hired by the same employer within 24 months, certification may be considered as suspended.All certifications shall be revoked when the individual’s conduct is found to be unethical.

8.4 认证恢复 REINSTATEMENT OF CERTIFICATION

满足以下要求时，方可恢复认证资格：

—— 若认证资格曾遭暂停，应在暂停原因得到纠正且经责任 3 级人员确认后由雇主验证纠正措施，方可恢复至原认证有效期。持证人员的熟练度须经责任 3 级人员或主考人员核验。

—— 若认证资格已过期，则必须通过专业考试与实操考试方可恢复。

—— 若认证资格曾被撤销，则必须通过理论考试、专业考试及实操考试，并在撤销

原因得到纠正、且经责任 3 级人员确认后由雇主验证纠正措施，方可恢复。

若人员持当前有效的国家航空航天无损检测委员会资格鉴定证明，可在新雇主处沿用该资格鉴定证明，前提是新雇主须根据责任 3 级人员确定并书面记录的、与其工艺和产品相关的补充考试要求，对持证人员进行额外考核。认证有效期仍应从原始认证日期起算。

Certifications shall be reinstated only if the following requirements have been met:

— Certifications that have been suspended shall be reinstated up to the original certification date when the cause for the suspension has been corrected and the correction verified by the employer after confirmation from the Responsible Level 3. The individual's proficiency shall be verified by the Responsible Level 3 or Examiner.

— Certifications that have expired shall only be reinstated by specific and practical examination.

— Certifications that have been revoked shall only be reinstated by general, specific, and practical examination, and when the cause for revocation has been corrected and the correction verified by the employer after confirmation from the Responsible Level 3.

Current NANDTB qualifications may be utilized for new employment provided that the new employer administers additional examinations that are representative of their processes and product as determined and documented by the Responsible Level 3. The expiration date of certification shall be from the original certification date.

8. 5 更新认证 RECERTIFICATION

8. 5. 1 1 级和 2 级 LEVEL 1 AND LEVEL 2

按照本文件要求认证的 1 级和 2 级人员的更新认证间隔时间应不超过 5 年。应通过成功完成专业考试和实操考试来进行更新认证。

Level 1 and 2 personnel certified to This document shall be recertified at intervals not to exceed five years. Recertification shall be accomplished by successful completion of specific and practical examinations.

8. 5. 2 3 级 LEVEL 3

按照本文件要求认证的 3 级人员的更新认证间隔时间应不超过 5 年。应按照附录 A 要求，或是通过成功完成专业考试和实操考试来进行更新认证。

Level 3 personnel certified to This document shall be recertified at intervals not to exceed five years. Recertification shall be accomplished in accordance with Appendix A or by successful completion of specific and practical examinations.

8. 5. 3 实操考试 HANDS-ON PRACTICAL EXAMINATION

如果验收产品是 3 级人员职责的一部分，则需要进行相当于 2 级人员的额外实操考试。

If accepting products is required as a part of the duties of Level 3, an additional hands-on practical examination equivalent to Level 2 is required.

8. 6 年度熟练程度评审 ANNUAL PROFICIENCY REVIEW

雇主应制定并实施文件化年度评审程序，以便在所有等级的认证周期内核查处理或

检测产品的人员对每种方法的熟练程度。

The employer shall develop and implement a documented annual process to verify technical proficiency for each method during the certification cycle for all levels of personnel processing or inspecting products.

附录 A Appendix A

无损检测 3 级人员更新认证的积分制

CREDIT SYSTEM FOR RECERTIFICATION OF LEVEL 3 NDT PERSONNEL

A1 范围 SCOPE

本附录规定了采用积分制进行的无损检测 3 级人员更新认证要求。这些要求仅适用于更新认证时持有有效的无损检测 3 级证书的人员。

This Appendix specifies the requirements for recertification of Level 3 NDT personnel using the credit system. It applies only to those persons holding a valid Level 3 NDT certification at the time of recertification.

A2 要求 REQUIREMENTS

应在认证失效日期之前至少提前 14 天将更新认证文件提交给责任 3 级人员或 NANDTB。责任 3 级人员重新认证申请，应直接向相关监管机构、NANDTB 或雇主提出申请，以供指定 3 级人员审核。

Documentation for recertification shall be submitted to the Responsible Level 3 or NANDTB at least 14 days prior to the expiration date of the certification. Application for recertification of the Responsible Level 3 shall be made directly to the applicable regulatory agency, NANDTB, or employer for review by a designated Level 3.

报考人应在过去 5 年内有至少 36 个月(在最后 24 个月内至少有 12 个月)从事更新认证方法的 3 级人员工作的经历。月份数量可累加计算，而不是连续月数才有效。

The candidate shall have been employed in a Level 3 function for a minimum of 36 months (at least 12 of which are in the last 24 months) within the previous five years in the method(s) for which recertification is sought. The number of months is cumulative and does not need to be consecutive months for validation purposes.

应证明用相关方法连续从事了检测工作。报考人应提供一份 5 年时间内用积分更新认证的每种无损检测方法从事的 8 项可核实的 3 级任务的清单。

Continuity in the method shall be demonstrated. The candidate shall provide a list of 8 verifiable Level 3 tasks in each NDT method for which recertification is sought during the five-year period.

注：3 级任务是指需要 3 级认证的活动（例如 NDT 技术说明、NDT 程序的批准）。

NOTE: A Level 3 task is an activity for which Level 3 certification is required (e.g. approval of an NDT Technique Instruction, NDT procedure)

报考人应提供客观证据来证明其在申请再认证的方法中始终掌握当前无损检测技术动态。具体要求是在五年认证期内（无论获得多少项认证或方法），通过开展表 A.1 所列各项活动的组合方式，累计获得至少 24 分。

Candidates shall provide objective evidence that they have kept up to date with current NDT technology in the method(s) for which they are seeking recertification by obtaining a minimum of 24 points during the five-year period of certification, irrespective of the number of certifications (methods) obtained, by engaging in a combination of activities listed in Table A.1.

附录 A 中所列活动的文件应由雇主程序文件中规定的责任 3 级人员或 NANDTB 来确定并形成文件。文件可能包括备忘录或报告、委员会输出文件的草稿或报考人就此类文件提交的正式书面意见。附录 A 中责任 3 级人员的更新认证要求应由雇主来确定并形成文件。5 年期内单一事件应仅能被作为一次积分奖励活动。

The approval of Appendix A activity documentation shall be determined and documented by the Responsible Level 3 or NANDTB as defined within the employer's written practice. Documentation may include memos or reports, drafts of committee output documents, or official written comments submitted by the candidate on such documents. Appendix A recertification for the Responsible Level 3 shall be determined and documented by the employer. A single event shall only be used for one award credit activity during a five-year period.

表 A.1 3 级 NDT 人员再认证积分奖励活动

TABLE A.1 LEVEL 3 AWARDED CREDIT ACTIVITY FOR RECERTIFICATION OF LEVEL 3 NDT PERSONNEL

活动 ACTIVITY	标准 CRITERIA	积分分配 Point Allocation	每 5 年最高积分 Max points per 5 years
撰写或合著无损检测技术论文、文献或白皮书 Authoring or co-authoring technical NDT papers, presentations, or white papers	独著 Sole Author	8	8
	合著 Co-author	4	
撰写或合著公司或行业无损检测规范或标准 Authoring or co-authoring for company or industry NDT specifications or standards	每份标准/规范 Each Standard/ Specification	2	8
出席系列机构组织的无损检测技术会议、委员会或专家小组会议： Attending NDT technical sessions, committee or panel meetings organized by: A）全国性或国际性技术协会、团体或协会 National or international technical societies, associations and institutes B）由来自多个地方的成员组成的公司间无损检测团队 Inter-company NDT teams comprised of members from several locations	1 天或 1 次会议 1 day or 1 meeting	1	8
	2 天 2 days	2	
	3 天或以上 3 or more days	4	
教授专门为学生获得无损检测资格认证而开设的课程的无损检测教员 NDT instructor teaching academic courses, or courses designed to prepare students for NDT qualification	每授课 4h For every 8 hours of instruction	4	8
参加专业技术课程或研讨会 Participating in technical coursesor seminars	有书面说明的每 8 h For every 8 hours of documented instruction	2	8
参加有积分的技术课程或研讨会 Participating in technical courses or seminars for which academic credit is given	获得的实际继续教育积分(CEU)或积分 For actual Continuing Education Units (CEUs) or academic credit earned	实际 CEU/积分 Actual CEUs/credit awarded	8
从认可行业单位获得首次 3 级认证证书(仅	每种方法获得的认	4	4

活动 ACTIVITY	标准 CRITERIA	积分分配 Point Allocation	每 5 年最高积分 Max points per 5 years
适用于首次专业认证)。 Obtaining an initial *Level 3 certificate from a recognized industry source (applicable only to initial professional certification). 这不适用于专业更新认证。 This does not apply to professional recertification	证 For each method obtained		
无损检测主考人 Nondestructive testing Examiner	每次资格鉴定考试 For each qualification examination	1	6
NDT related technical and/or scientific publications published either internally or externally 由内部或外部发行的有关无损检测技术和/或科学出版物	For each published paper 每发表的一篇论文	4	8
有文件记录的对公司、技术协会或行业委员会项目作出的无损检测贡献 Documented NDT contributions to company, technical society, or industry committee projects	有文件记录的每次贡献 For each documented contribution	4	8
有文件记录的参与无损检测相关研究、开发或调查活动 Documented participation in NDT-related studies, developments, or investigations	有文件记录的每次贡献 For each documented contribution	4	8
作为 3 级人员连续满意表现的记录 Documented continuous satisfactory performance as a Level 3	认证期内的每种方法的书面证明 Written testament for each method in the certification period	1	4
参加无损检测设备或贸易展览会 Attend NDT equipment or trade show	每参加一次 For each show attended	1	4
进行外部无损检测审核 Conduct external NDT audits	每进行一次外部审核 For each external audit conducted	2	6
开发新的无损检测工艺、设施或系统 Development of new NDT processes, facilities, or systems	有文件记录的每次贡献 For each documented contribution	4	8
提交和/或获得无损检测产品或工艺专利 Submitting and/or obtaining a patent for an NDT product or process	唯一发明人 Sole inventor	8	8
	共同发明人 Co-inventor	4	

附录 B Appendix B

有限 1 级人员的资格鉴定与认证

QUALIFICATION & CERTIFICATION OF LEVEL 1-LIMITED

B1 范围 SCOPE

除本文件规定的所有要求外，本附录还规定了有限 1 级无损检测人员的资格鉴定与认证要求。附录 B 仅适用于经认可的工程组织和雇主程序文件授权的情况。

This Appendix specifies the requirements for qualification and certification of Level 1-Limited NDT personnel in addition to all specified requirements within This document. Appendix B only applies when authorized by the cognizant engineering organization and the employer's written practice.

B2 要求 REQUIREMENTS

B2.1 当有认可的工程组织和雇主程序文件授权时，按照有限 1 级认证的人员可对指定零件、部件或组件进行特定无损检测。每个有限 1 级认证均为单独认证，并且应得到认可的工程组织的批准。在任何时候，个人不应持有 3 项以上有限 1 级认证证书。应将下列内容形成文件，并提供给雇主的顾客和监管机构审查：

- 逐项说明使用有限 1 级人员的理由；
- 认可的工程组织的批准；
- 培训和实践经历小时数及试题数量；
- 将要进行的具体无损检测；
- 将要检测的具体产品；
- 验收或拒收产品的授权(如适用)。

When authorized by the cognizant engineering organization and the employer's written practice, the performance of a specific NDT test on a specified part, feature, or assembly may be performed by personnel certified to Level 1- Limited. Each use of Level 1-Limited is a separate certification and shall be approved by the cognizant engineering organization. An individual shall not possess more than three Level 1-Limited certifications at any given time. The following shall be documented and be made available for review by the employer's customers and regulatory agencies:

- The case-by-case justification for using Level 1-Limited;
- The cognizant engineering organization approval;
- The training and experience hours and the number of examination questions;
- The specific NDT test to be performed;
- The specific products to be tested;
- The authority to accept or reject products, if applicable.

B2.2 有限 1 级认证 Level 1- Limited Certification

有限 1 级认证是一种仅可对指定零件、部件或组件进行特定无损检测的有限认证。对于经过此认证的检测技术和方法，有限 1 级人员应：

- 能够遵守工艺卡要求；
- 必要时，接受相同方法的 2 级或 3 级持证人员的指导或监督；
- 具备按照经批准的工艺卡处理零件、记录结果与标定设备的技能和知识；
- 具备按照经批准的工艺卡在检测前后对零件进行任何必要的准备工作的技能和知识；
- 当程序文件中有规定，并且认可的工程组织允许时，具备评定检测结果，并且按照经批准的工艺卡要求在责任 3 级人员记录的限制范围内验收或拒收特定零件、部件或组件的技能和知识。

Level 1-Limited is a limited certification allowing only the performance of a specific NDT test on a specified part, part feature, or assembly. In the test technique and method in which certified, Level 1-Limited personnel shall:

- Be able to follow work instructions;
- Receive guidance or supervision from a certified Level 2 or Level 3 in the method when necessary;
- Have the skills and knowledge to process parts, document results and perform equipment standardization in accordance with approved work instructions;
- Have the skills and knowledge to carry out any necessary preparation of parts before or after testing in accordance with approved work instructions;
- When specified in the written practice and when the cognizant engineering organization allows, have the skills and knowledge to evaluate test results and perform acceptance or rejection of a specific part, part feature, or assembly in accordance with approved work instructions, and within the limitations documented by the Responsible Level 3.

B2.3 有限 1 级培训 Level 1-Limited Training

有限 1 级的最低培训学时应由责任 3 级人员确定并形成文件，但不应少于适用方法的 1 级所需时间的 25%。

The minimum training hours for Level 1-Limited shall be determined and documented by the Responsible Level 3, but shall not be less than 25% of those required for Level 1 in the applicable method.

B2.4 有限 1 级的实践经历 Level 1-Limited Experience

有限 1 级的实践经历要求应由责任 3 级人员确定并形成文件，但不应低于适用方法的 1 级要求的 10%。

Experience requirements for Level 1-Limited shall be determined and documented by the Responsible Level 3, but shall not be less than 10% of those required for Level 1 in the applicable method.

B2.5 有限 1 级考试 Level 1-Limited Examinations

考试类型：考试应包括根据本文件要求进行的理论考试、专业考试、实操考试和视力测验。附录 B 中的下列段落中给出了关于有限 1 级的要求。

Types of examinations: Examinations shall consist of a general, specific, practical, and visual acuity in accordance with This document. The following Appendix B allowances for Level 1-limited are

provided:

理论考试：有限 1 级的理论考试的试题数量应至少为 10 道。

General Examination: A minimum of 10 questions shall be administered for the general examination for Level 1- Limited.

专业考试：有限 1 级的专业考试的试题数量应至少为 8 道。

Specific Examination: A minimum of 8 questions shall be administered for the specific examination for Level 1- Limited.

实操考试：对于所要认证的每种技术和零件构造，有限 1 级报考人应通过按照工艺卡处理至少 1 个试件来证明其熟练程度。试件应符合本文件的定义，并应代表报考人在履行其与雇主的职责时遇到的特定产品。如果责任 3 级人员批准其验收或拒收产品，则报考人应解释并记录试件的检测结果。检查表中应包括设备和材料使用及标定方面的熟练程度、对程序细节的遵守情况；如适用，还应包括在显示的解释与评定方面的熟练程度。

Practical Examination: The Level 1-Limited candidate shall demonstrate proficiency by using a work instruction to process at least one test sample for each technique and part configuration for which certification is sought. The test sample(s) shall meet the definition in This document and be representative of the specific product to be encountered by the candidate in the performance of their duties with the employer. If approval to accept or reject products is to be granted by the Responsible Level 3, the candidate shall interpret and document the results of the inspection of the test sample(s). The checklist shall include proficiency in the use and standardization of equipment and materials, adherence to procedural details and, if applicable proficiency in the interpretation and evaluation of indications.

B2.6 记录 Records

对于有限 1 级认证，在证书有效期内，雇主应保存下列记录：

- 持证人姓名；
- 最近一次参加的笔试和实操考试及前一次考试的成绩；
- 当前认证的日期和有效期。对于已暂停或撤销的认证，应记录理由和日期。如适用，还应记录恢复认证的日期和措施；
- 培训和实践经历小时数；
- 具体理由及认可的工程组织的批准
- 认证时长（长达 2 年）；
- 将要进行的具体无损检测；
- 将要检测的具体产品；如适用，包括验收或拒收产品的批准信息；
- 最近（也就是当前）的视力和色觉检查结果；
- 授权认证的雇主代表的姓名和签字；
- 最近的年度熟练程度评审结果。

For Level 1-Limited certifications, the following records shall be maintained by the employer as long as the certification is in effect:

- Name of the certified individual;
- The latest written and practical examinations and the scores from the immediately previous exams;
- Date and expiration of current certification(s). Suspended or revoked certification(s) shall be documented for reason and date. If applicable, date and action to reinstate certification(s) shall also be documented;
- Training and experience hours;
- Case-by-case justification and the cognizant engineering organization's approval;
- Length of the certification (up to 2 years);
- Specific NDT test to be performed;
- Specific products to be tested, and, if applicable, the approval to accept or reject products;
- Results of the most-recent (i.e. current) visual acuity and color perception examinations;
- The name and signature of the employer's representative authorizing the certification;
- Results of most recent annual proficiency review.

B2.7 更新认证 Recertification

对于间隔不超过两年的每一认证，有限 1 级人员应通过成功完成实操考试和专业考试来进行更新认证。

Level 1-Limited personnel shall be recertified for each certification held at intervals not to exceed two years by successful completion of practical and specific examinations.

附录 C Appendix C

国家航空航天无损检测委员会

NATIONAL AEROSPACE NON-DESTRUCTIVE TESTING BOARDS (NANDTB)

C1 范围 SCOPE

本附录规定了按照本文件要求在国家航空航天无损检测委员会（NANDTB）总体控制下对无损检测人员进行资格鉴定的要求。

This Appendix specifies the requirements for qualification of NDT personnel under the general control of a National Aerospace Non-destructive Testing Board (NANDTB) in accordance with This document.

C2 要求 REQUIREMENTS

NANDTB 是一个代表国家航空航天工业，由参与的主承包商特许并且经国家监管机构认可的按照本文件要求提供或支持无损检测人员资格鉴定服务的独立航空航天组织。每个 NANDTB 均应得到国家监管机构的正式书面认可。

A NANDTB is an independent national aerospace organization representing a nation's aerospace industry that is chartered by the participating prime contractors and is recognized by the nation's Regulatory Agency to provide or support NDT qualification services in accordance with This document. Each NANDTB shall be recognized formally in writing by the nation's Regulatory Agencies.

各 NANDTB 应按本文件要求来定义、组织、实施和管理活动。

Each NANDTB shall define, organize, administer and manage activities in accordance with This document.

各 NANDTB 应有书面章程和管理委员会，并按照管理规定和工作程序进行管理，还应发布包含了下列内容的法规或类似文件：

- 委员会的章程、职权范围和工作方法；
- 委员会的宗旨和目标；
- 表决和商定决议的议事规则；
- 成员组织应达到的标准；
- 申请加入和选举成员组织的程序，以及关于终止成员资格的规则；
- 目前为委员会成员的组织的名称和地位；
- 所任命管理人员（例如主席、秘书、工作组召集人）的职责、责任和任期；
- NANDTB 控制由内部和外部考试机构管理的资格考试的方法；
- 考试机构标准，包括审核和批准程序；
- 为受其控制的考试机构提供培训和考试证书内容的指导；
- 认可由其他国家委员会控制的考试机构签发的批准文件的政策。

Each NANDTB shall have a written constitution, deciding entity and be governed according to administrative and working procedures and shall issue a statute or similar document containing:

- The constitution, terms of reference and methods of working of the Board;

- The aims and objectives of the Board;
- Rules of procedure for voting and agreeing resolutions;
- The criteria to be met by member organizations;
- The procedure for applying for membership and election of member organizations, together with rules regarding termination of membership;
- The names and status of the organizations presently in membership of the Board;
- Duties, responsibilities and tenure of appointed officers (e.g. chairman, secretary, convener of working groups);
- The method(s) by which the NANDTB controls qualification examinations administered by internal and external examination bodies;
- Examination body criteria, including the audit and approval process;
- Guidance to examination bodies under its control on the content of certificates issued for training and examinations;
- Policy on recognition of examination body approvals issued under the control of other national boards.

管理委员会的投票成员至少应为国家监管机构批准的设计、生产和/或维修机构的 3 级人员。为支持 NANDTB 的活动，其他成员可被视为有表决权或无表决权的成员。

As a minimum, the voting members in the deciding entity shall be Level 3 personnel from design, production and / or maintenance organizations that are approved by the nation's regulatory agency. Other members may be co-opted as voting or non-voting members as necessary to support the activities of the NANDTB.

民用和/或国防管理机构有权被列为 NANDTB 的观察员成员。

Regulatory agencies for civilian and/or defense have the right to be included as observer members of the NANDTB.

各 NANDTB 应在公共论坛（例如网站）上披露下列信息：

- 委员会的书面章程和职权范围；
- 监管机构的认可确认信息；
- 成员（公司和相关代表）名单；
- 核准的培训和考试机构名单（用母语和英语给出）；
- 委员会公布的程序清单，包括如何使用这些程序的信息；
- 资格证书中至少需包含的内容（用母语和英语给出）。

Each NANDTB shall disclose on a public forum, e.g. on a web site:

- Written constitution and terms of reference of the Board;
- Confirmation of recognition by the regulatory agency;
- A list of NANDTB Members (Company and relevant representatives); NANDTB
- A list of approved training and examination bodies (in the national and English language);
- A list of procedures published by the Board, with information on how these may be accessed;
- Minimum content required for qualification certificates (in the national and English language).

适用 NANDTB 程序应可供雇主的顾客和监管机构审查/审核。

Applicable NANDTB procedures shall be available for review / audit by the employer's customers and regulatory agencies.

雇主的责任 3 级人员可委托 NANDTB 来：

- 编写培训大纲和培训教材；
- 建立考试题库和管理考试；
- 批准提供培训和/或考试服务的内部和/或外部组织。
- 规定其他无损检测方法的人员资格鉴定要求；
- 保存笔试和实操考试记录；
- 为提供培训和考试服务的外部或内部组织指定主考人和/或教员；
- 评估考试机构是否对顾客要求作出了全面规定、记录并完全理解顾客要求。

当由 NANDTB 来提供此类服务时，其应制定用于确保完全满足本文件要求的程序和工艺规程。由 NANDTB 开展/制定的活动、程序、工艺规程等应可供总承包商和监管机构审查/审核。对于没有 NANDTB 的国家，可由其他 NANDTB 提供服务，但除非地方或监管要求中有规定，否则不要求这样做。

The employer's Responsible Level 3 may use an NANDTB to:

- Develop training outlines and training material;
- Create examination questions and administer examinations;
- Approve outside and/or internal organizations providing training and/or examination services;
- Define requirements for qualification of NDT personnel in other methods;
- Retain written and practical examinations;
- Designate Examiners and/or instructors at outside or internal organizations providing training and examination services;
- Evaluate that the clients' requirements are fully specified, recorded, and understood by the examination body.

Where an NANDTB is used to provide such services, it shall develop processes and procedures that shall ensure full compliance with the requirements of This document. The activities, processes, procedures etc. undertaken/developed by an NANDTB shall be made available for review / audit by prime contractors and regulatory agencies. For countries where no NANDTB exists, the services of other NANDTB's may be used, but are not required to do so unless specified by local or regulatory requirements.

如果由 NANDTB 来提供培训和/或考试服务，则应将其视为外部机构，并且雇主的责任 3 级人员应核查培训和/或考试是否符合雇主要求。

If an NANDTB is used to provide training and/or examinations, it shall be treated as an outside agency and the employer's Responsible Level 3 shall verify that the training and/or examinations meet the employer's requirements.

如果启用了 NANDTB，则专业考试和实操考试可涵盖未包含雇主的所有要求的更广泛的范围。如果 NANDTB 采用了更广泛的范围，则雇主负责管理代表了雇主工艺的补充专业考试和实操考试。如果国家航空管理局有要求，则这些补充考试应受控于雇主或 NANDTB。

Where an NANDTB is used, the specific and practical examinations may cover a wider scope that does not include all the employer's requirements. Where a wider scope is used by the NANDTB the

employer is responsible for administering supplemental specific and practical examinations which are representative of the employer's processes. These supplemental examinations shall be under the control of an employer or NANDTB when required by the National Aviation Authority.

对于其他无损检测方法，如果相关 NANDTB 有用于评定新无损检测方法的首个 3 级人员的流程，则应采用适用的 NANDTB 流程。

For other NDT methods, where the applicable NANDTB has a process for qualifying in a new NDT method, the applicable NANDTB process shall be used.

C3 考试 EXAMINATIONS

考试机构对无损检测考试的控制和管理应接受 NANDTB 或是受 NANDTB 监督的组织（例如无损检测协会）的审核。当 NANDTB 作为考试机构时，其审计工作须由独立组织（如国家航空管理局/军事航空管理局）或主管机构指定的其他方执行。审核应由符合本文件要求的审核员进行，内容应包括：

- 对涵盖了且符合批准标准要求的航空航天无损检测人员考试的质量文件进行的评审；由符合无损检测人员质量标准的无损检测人员审批；
  - 考试机构的质量体系文件和程序文件；
- 相关法规、标准和规范的可获得性，包括雇主程序文件(如有需要)；
- 对于外部机构，确保进行合同评审；
- 任命具备合适资格和实践经历的考试人员；
- 保密性、公正性和安全性要求；
- 编制适用于范围（与产品、无损检测工艺规程和工艺相关）的专业考试和实操考试；
- 按照本文件要求进行阅卷和打分。

The control and administration of NDT exams at examination bodies shall be subject to audit either by an NANDTB or by an organization (e.g. NDT society) which is overseen by the NANDTB. In the case of a NANDTB, acting as examination body, audits shall be carried out by an independent organization such as NAA (National Aviation Authority/Military Aviation Authority) or other party as defined by the authority. This audit shall be conducted by auditors who comply with This document and shall include:

- Review of quality documentation covering the examination of aerospace NDT personnel meeting the requirements of the approval criteria;
  - Examination bodies quality system documents and procedures;
- Availability of codes, standards and specifications as relevant, including if needed, the employer's written practice;
- For external bodies, assurance that a contract review took place;
- Appointment of appropriately qualified and experienced examination staff;
- Confidentiality, impartiality and security;
- Compilation of written specific and practical examinations appropriate to scope (relevant to products, NDT procedures and processes);
- Examination marking and grading in accordance with This document.

如果 NANDTB 符合本文件的最低要求，并且是航空航天无损检测委员会论坛的成员，则外部机构可通过得到本国 NANDTB 和/或其他国家 NANDTB 的正式批准予以认可，并进行受控管理。

Outside Agencies under the control of a NANDTB may be recognized by formal approval of NANDTBs and/or organizations in other countries where the controlling NANDTB complies with the minimum requirements of This document and is a member of the Aerospace NDT Board Forum.

C4 记录保存 RECORD RETENTION

当采用 NANDTB 时，最近一次参加的笔试和实操考试的成绩应由雇主保存，但实际考试记录可由 NANDTB 保存。除实际考试记录外，所有此类记录均应在员工有要求时，或是以任何原因离开公司时提供给相关员工。

When an NANDTB is used, the scores for the latest written and practical examinations shall be kept by the employer but actual examinations may be kept by the NANDTB. All such records, except for actual examinations, shall be made available to the applicable employee upon request or upon leaving the company for any reason.

C5 中国“航空航天无损检测认证部”National Aerospace NDT Board of China

中国“航空航天无损检测认证部”英文缩写 NANDTB-CN。是经国防科技工业政府主管部门批准，国防科技工业无损检测人员资格鉴定与认证委员会（DiNDT）正式发文成立，按照 NAS410/EN4179 标准中 NANDTB 的要求开展无损检测人员资格鉴定与认证工作的第三方技术组织，已获得国内外主承包商及供应商的广泛支持和认可。航空航天无损检测认证部（NANDTB-CN）依据国际宇航 NAS410/EN4179 标准，制定本认证准则做为认证依据，满足国家标准 GB/T 36439 的技术要求，为从事航空航天及高端装备的无损检测人员提供专业技术培训和资格鉴定考试服务。

National Aerospace NDT Board of China, abbreviated as NANDTB-CN, is a third-party technical organization approved by the government department in charge of national defense science and technology industry. It was officially established through a document issued by the National Defense Science and Technology Industry Non-Destructive Testing Personnel Qualification and Certification Committee (DiNDT). It conducts non-destructive testing personnel qualification and certification work in accordance with the requirements of NANDTB specified in the NAS410/EN4179 standards. It has received extensive support and recognition from major domestic and international contractors and suppliers. Based on the international aerospace NAS410/EN4179 standards, the Non-Destructive Testing Certification Department for Aerospace (NANDTB-CN) has formulated this certification criteria as the basis for certification, meeting the technical requirements of the national standard GB/T 36439. It provides professional technical training and qualification examination services for non-destructive testing personnel engaged in aerospace and high-end equipment.

附录 D　APPENDIX D

3 级初次资格鉴定的积分制

CREDIT SYSTEM FOR INITIAL QUALIFICATION FOR LEVEL 3

D.1 范围 SCOPE

本附录规定了基于能力的积分点制度，用以替代满足表 5 的经验要求，从而获得各检测方法 3 级初次资格的要求。本制度仅适用于在所申请方法中持有有效 2 级无损检测认证的人员，且仅适用于该方法 3 级资格的初次认证。利用积分点进行的重新认证仍应依据附录 A 执行。使用本附录不免除报考人参加本标准第 7 节规定之考试的要求。

This appendix specifies the requirements for initial qualification for Level 3 per method, using a competency-based credit system, in lieu of meeting experience requirements per Table 5. It applies only to those persons holding a valid Level 2 NDT certification in the applicable method, and it applies only for initial qualification to Level 3 in the method. Recertification utilizing points will still be in accordance with Appendix A. Use of this appendix does not exempt candidates from Examination per Section 7 of this document.

D.2 要求 REQUIREMENTS

根据表 D.1，要获得某方法的 3 级考试资格，报考人须作为该方法的 2 级人员，累计获得 36 个积分点，其中至少 20 个点必须来自“最低要求活动”（如表中所列）。

报考人应记录所有相关的 3 级任务，并通过参与表 D.1 所列活动的组合，累积获得至少 36 个点。所有或部分可核实的过往积分点，若适用，可被接受。

这些任务至少应属于报考人在履行其职责时需要完成的典型任务。报考人为在本附录框架内积累积分点而执行的任何任务，均须按责任 3 级人员的要求进行监督和批准。

表 D.1 列出了在各能力类别中允许累积的最低及累计积分点数，以及这些类别中各项活动的积分点分配。同一事项仅可用于一项 1 授予积分点的活动，不得用于多项活动或多种方法。

附录 D 相关文件的批准，应由雇主的书面规程中定义的责任 3 级人员或国家航空航天无损检测委员会确定并记录在案。

当使用附录 D 使 2 级人员获得 3 级资格认证时，无论采用何种方法，用于达到任何 3 级资格认证要求的最短累积时间均为 1 年。

To be eligible for Level 3 examination in a method according to Table D.1, the candidate shall accrue thirty-six (36)cumulative points as a Level 2 in the method, with twenty (20) of those points being in the minimum points activities, as listed.

Candidates shall log all relevant Level 3 tasks and accrue the minimum of thirty-six (36) points by engaging in a combination of activities listed in Table D.1. All or a portion of verifiable previous points may be accepted as applicable.

Tasks shall be typical of those to be accomplished in the performance of the candidate’s duties, at a minimum. Any task being performed by the candidate to accrue points within this appendix shall be supervised and approved as required by the Responsible Level 3.

Table D.1 lists the allowable minimum and cumulative points to be accrued in each of the competence categories, and the point allocation for activities in those categories. A single event shall only be used for one (1) credit awarding activity and cannot be applied to multiple activities or methods.

The approval of Appendix D documentation shall be determined and documented by the Responsible Level 3 or NANDTB, as defined within the employer's written practice.

When Appendix D is used for a Level 2 to become eligible for Level 3 qualification, a minimum time of one (1) year will be used to attain eligibility for any Level 3 qualification, regardless of method

表 D.1 3 级初始资格可获学分的活动

TABLE D.1 - AWARDED CREDIT ACTIVITIES FOR INITIAL QUALIFICATION TO LEVEL 3

Competence Category 能力类别	Activity 活动	Points allocation 积分点分配	Minimum Points to be Accrued within this Category 本项需累积的最低学分
Procedural Documentation 规程文件编写	*Authoring Engineering Specification*编制工程规范	6 points per document 每个文件 6 学分	8 Points Minimum 最低 8 学分
	*Authoring New Procedure *编制新规程文件	4 points per document 每个文件 4 学分	
	*Authoring New Inspection Plan or Work Instruction *编制新检测计划或作业指导书	2 points per document 每个文件 2 学分	
	*Technical Revision to Procedure *程序文件技术修订	1 point per document 每个文件 1 学分	
Continuing Education/Professional Development 持续教育/专业发展	NDT Society Meetings/Technical Sessions/Committees/Technical Training/Courses/Seminars 参加无损检测学会会议/技术研讨会/委员会/技术培训/课程/讲座	1 point per 4 hrs 每 4 小时 1 学分	4 Points Minimum 最低 4 学分
Training/Qualification 培训/认证	Delivering Technical Instruction (Classroom training)进行技术授课（课堂培训）	1 point per 4 hrs 每 4 小时 1 学分	4 Points Minimum 最低 4 学分
	Supervision of Trainee(s) (OJT) 监督学员（在职培训）	1 point per 8 cumulative hrs 每累计 8 小时 1 学分	
	Writing Exams 编写考试试卷	1 point per exam paper 每份试卷 1 学分	
Technical Control 技术控制	Conduct Technical External Audit (Primary Auditor)作为主审核员实施外部技术审核	2 points per audit 每次审核 2 学分	4 Points Minimum 最低 4 学分
	Conduct Technical Internal Audit (Primary Auditor) 作为主审核员实施内部技术审核	1 point per audit 每次审核 1 学分	
	Second Auditor (External or Internal)担任第二审核员（外部或内部）	1 point per audit 每次审核 1 学分	
	Developing Processes, Facilities, Systems 开发工艺、设施、系统	3 points per documented activity 每个有文件记录的活动 3 学分	
	Investigations, Developments, Studies, etc. 参与调查、开发、研究等项目	2 points per documented activity 每个有文件记录的活动 2 学分	
	L3 in Volumetric Methods (>12 Months)担任内部缺陷检测方法 3 级人员（>12 个月）	4 points per method 每种方法 4 学分	
	L3 in Other Methods (>12 Months) 担任其他检测方法三级人员（>12 个	2 points per method 每种方法 2 学分	

Competence Category 能力类别	Activity 活动	Points allocation 积分点分配	Minimum Points to be Accrued within this Category 本项需累积的最低学分
	月）		
	Developing&Authoring NDT Technical Audit Checklist 制定或编写 NDT 技术审核检查单	1 point per checklist 每个检查单 1 学分	
Capability Development 能力拓展	Patents 获得专利	8 points sole inventor / 4 points co-inventor 独立发明人 8 学分 / 共同发明人 4 学分	0 Points Minimum 最低 0 学分
	Company, Tech Society, or Industry Committee Projects (including Standards Development) 参与公司、技术学会或行业委员会项目（包括标准制定）	2 points committee lead / 1 point co-contributor 委员会负责人 2 学分 / 共同贡献者 1 学分	
	Authoring NDT Paper/ Presentation for External Conference/Publication 撰写并发表外部会议/出版物用无损检测论文/报告	2 points sole author / 1 point co-author 独立作者 2 学分 / 合著者 1 学分	
*A revision is considered where 25% or more of the technical information in the document is changed. Editorial and administrative changes do not count as technical changes to the document. *技术修订指文件中 25%或以上的技术信息发生变更。编辑性和行政性修改不计为文件的技术变更。			

附录 E
Appendix E
腐蚀检测人员资格鉴定要求
Qualification Requirements of Etch Inspectors

E1 范围 Scope

本附录规定了腐蚀检测人员资格鉴定、更新和认证的要求。腐蚀检测方法包括了化学腐蚀检测（钢、钛、镍）和阳极化腐蚀检测（铝、钛）。

本附录适用于 H-11 工具钢、440C 不锈钢等材料的检测，不适用于 A286 镍基合金等材料。本文件等效采用 SAE ARP1923B-2023 标准。

This specification covers the requirements for qualification, requalification, and certification of etch inspectors.Etch Inspectors include chemical etch inspectors (CEI:steel, titanium, nickel) and etch anodic inspectors (aluminum, titanium).

This appendix is applicable to the testing of materials such as H-11 tool steel and 440C stainless steel, but not to materials such as A286 nickel-based alloy. This document is equivalent to the SAE ARP1923B-2023 standard.

E.2 实践经历 Experience

报考人应具备足够的实践经历，以确保其能够履行 EI 方法的职责。EI 人员的最短经历要求如表 E.1 中所示。为获得经历而进行的岗位培训，应在持证人员的指导下进行。应当有文件记录学员实践经历的日期、任务、小时数和监督指导人的资格证明。

EXPERIENCE: Candidates shall have sufficient practical experience to assure that they are capable of performing the duties of the EI methods for which certification is sought. The minimum experience requirements for EI methods are provided in Table E.1, as applicable. On-the-job training for the purpose of gaining experience shall be overseen by personnel certified in accordance with SAE ARP1923. For trainees gaining experience, documentation shall be available for review to indicate individual, date, task, hours, and certified personnel providing direct observation.

表 E.1 最短工作经历要求

腐蚀检测方法	初次取证	复证
化学腐蚀检测（钢、钛、镍）	400	270
阳极化腐蚀检测（铝、钛）	400	270

Table D.2 Minimum Experience Requirements Experience Time in Hours

EI Method	Without previous EI certification	With previous EI certification
CEI（Steel、Titanium、Nickel）	400	270
EAI（Aluminium、Titanium）	400	270

E.3 培训 Form Training

报考人应完成足够学时的正式培训，以便熟悉 EI 方法和技术的原理和实践，并有能

力履行规定的职责。正式培训应在上岗培训之前或与岗位培训同时进行。培训应做书面记录。

表 E.2 列出了 EI 方法的最短培训学时。雇主或外部机构可以进行理论、专业和实际操作培训，但是必须有雇主的岗位培训进行补充。

TRAINING: Candidates for certification shall complete sufficient formal training to become proficient with the principles and practices of the applicable EI method and technique(s) and be capable of canying out the duties. Formal training shall be conducted prior to, or in conjunction with, on-the-job training. All EI training shall be documented.

The minimum training hours are provided in Table E.2 for the EI methods. General, specific and practical training may be obtained with the employer or outside agency but shall always be supplemented by practical on-the-job training with the employer.

表 E.2: 最短正式培训时间

腐蚀检测方法	初次取证（学时）	复证（学时）	补充培训（学时）
化学腐蚀检测（钢、钛、镍）	32	16	4
阳极化腐蚀检测（铝、钛）	32	16	4

Table D1: Minimum Formal Training Hours of EI method

EI Method	Without previous EI certification	With previous EI certification	Addition Training
CEI（Steel、Titanium、Nickel）	32	16	4
EAI（Aluminium、Titanium）	32	16	4

E4 资格鉴定要求 Qualification Requirements

E4.1 体检 Physical Examination

报考人需要由具备医疗资质的人员进行视力测试，要求在自然视力或矫正视力状态下，至少有一只眼睛能够在 12 英寸（305mm）距离，识别 Jaeger# 2 或 20/30 的斯内伦近视力表。

The inspection applicant shall pass a vision test administered by medically qualified personnel with a requirement of reading Jaeger #2 or 20/30 Snellen near vision, at 12 inch (305 mm) in at least one eye, natural or corrected.

E4.2 书面考试 Written Exanunation

书面考试包括理论考试和专业考试，报考 3 级不需要参加基础考试。

The written examination includes theoretical tests, and professional tests. Candidates applying for Level 3 are exempt from the basic examination.

每份笔试试卷至少包括 30 个试题。试题应包括：检测过程中清洗、操作程序和检验技术。笔试考试通过的最低评分得分为 80%。推荐采用 SAE ARP1923 附件 A 的试题作为笔试试题。

At least thirty written questions shall be administered to the inspection applicant. Questions shall

include cleaning, operating procedures, and inspection techniques that the applicant would encounter during inspection. A minimum grade of 80% is required for acceptance. The questions of Appendix A (SAE ARP1923) are recommended for this written examination.

D4.3 实操考试 Practical Exammation

实操考试，每个申请人至少选取 3 件具有代表性的实际产品试件进行检测。在检测过程中，至少有 10 个不同的评分考核点，以证明其对检测变化因素的理解和执行腐蚀检测并正确地解释结果的能力。检测中，所有不合格零件应被拒收，实操考试通过的最低评分得分为 80%。推荐使用 SAE ARP1923 附件 B（附表）作为实操考试评分表。

At least three selected specimens representative of actual products shall be tested by the inspection applicant. During these tests, at least ten different check points shall be graded showing an understanding of test variables and an ability to perform etch inspection and correctly interpret its results. During these tests all rejectable parts shall be so rejected and a minimum grade of 80% is required for acceptance. The Appendix B Table (SAE ARP1923) is a recommended checklist for this practical examination.

E.4.4 补考 RE-EXAMINATION

参加考试但未通过资格鉴定的学员，应等待 30 天后才能参加补考，并且需要提供采取适当纠正措施和补充培训或自学的证据。

Personnel examined and not meeting qualification standards shall wait 30 days and show evidence of having taken suitable corrective action and additional training or self-study before reexamination.

E5 认证要求 Certification Requirements

E.5.1 认证 Certification

所有资格鉴定合格人员的记录，包括资格鉴定日期、体检结果、书面和实际操作考试结果，以及腐蚀检测工作经历。

Records for all qualified personnel shall be maintained and include date of qualification, results of physical, written, and practical examinations, and experience as a etch inspector.

E.5.2 资格保持 Qualification maintenance

腐蚀检测人员在从事生产零件的腐蚀检查前，需按照本附录要求完成资格鉴定。在进行资格鉴定与认证后的每年，从事腐蚀检测人员还须按照内部程序进行年度的体检、书面考试和实操考试来保持资格有效性，直至资格证书到期。

Before performing etch inspection on production parts, inspection personnel shall be qualified in accordance with this recommended practice. At qualification and each year thereafter, inspection personnel shall pass physical, written, and practical examinations, until the certificate expires.