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Langley Research Center

Workmanship Standards Personnel Certification Program

National Aeronautics and Space Administration

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PREFACE

P.1 PURPOSE

a. This guideline sets forth criteria for training and certifying Langley Research Center (LaRC) personnel performing work covered by the NASA Workmanship Standards and the general requirements for re-certification and maintaining workmanship certifications. The criteria contained in this directive are intended to promote standardized designs and fabrication practices to enhance assembly durability and reliability and to restrict the use of designs and manufacturing processes known to reduce those qualities.

b. The requirements in this directive are mandatory for personnel working on projects involving flight hardware and mission critical ground support equipment for Exploration/Constellation projects, atmospheric science instruments, satellites and missions, International Space Station payloads and experiments, and planetary science payloads and missions. These requirements may also be required on risk reduction flights; flight experiments; flights of opportunity that are sub-orbital; involve sounding rockets; un-crewed aerospace vehicles; drop models; and major Unmanned Aerial Vehicle (UAV) operations.

P.2 APPLICABILITY

This LPR is applicable to all LaRC employees, and contractors to the extent specified in their contracts..

P.3 AUTHORITY

51 USC 20113(a), the National Aeronautics and Space Act, as amended.

P.4 APPLICABLE DOCUMENTS AND FORMS

- a. LPR 8739.21, "Langley Research Center (LaRC) Procedures and Guidelines for Electrostatic Discharge (ESD) Control of ESD-Sensitive (ESDS) Devices Program"
- b. LMS-CP-4316, "Off-Site/On-Site Training Process"
- c. LF 359, "Workmanship Standards Certification Record"
- d. NASA-STD-8739.1, "Workmanship Standard for Polymeric Application on Electronic Assemblies"
- e. NASA-STD-8739.2, "Workmanship Standard for Surface Mount Technology"

- f. NASA-STD-8739.3, "Soldered Electrical Connections"
- g. NASA-STD-8739.4, "Crimping, Interconnecting Cables, Harnesses, and Wiring"
- h. NASA-STD-8739.5, "Fiber Optics Terminations, Cable Assemblies, and Installation"

P.5 MEASUREMENT/VERIFICATION

NONE

P.6 CANCELLATION

NONE

Original signed on file

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1. INTRODUCTION

1.1 Purpose

This document establishes responsibilities for training and certifying Langley Research Center (LaRC) personnel performing work covered by the NASA Workmanship Standards and the general requirements for re-certification and maintaining workmanship certifications. For personnel training/qualification which does not require certifications, reference the Langley Management System (LMS) Center Procedure LMS-CP-4316, Off-Site/On-Site Training Process.

1.2 Scope

1.2.1 This document is applicable to LaRC personnel working on projects involving flight hardware, mission critical ground support equipment, and elements thereof as stipulated in the Project Product Assurance Plan (PAP).

1.2.2 These workmanship standards are typically included for Exploration projects, atmospheric science instruments, satellites and missions, International Space Station payloads and experiments, and planetary science payloads and missions. These requirements may also be required on risk reduction flights; flight experiments; flights of opportunity that are sub-orbital; involve sounding rockets; uncrewed aerospace vehicles; drop models; and major Unmanned Aerial Vehicle (UAV) operations.

2. TRAINING & CERTIFICATION

2.1 General

2.1.1 Personnel performing Workmanship Standard disciplines shall be qualified as either operators or inspectors to the applicable NASA Standard in section P.4.

2.1.2 Operators shall be authorized to perform work on flight and flight-associated hardware.

2.1.3 Inspectors shall be authorized to accept/approve flight and flight-associated hardware.

2.1.4 Operators, inspectors, and instructors shall be qualified to fulfill all requirements of the applicable Workmanship Standard involved in their assigned tasks.

2.1.5 Qualification shall consist of proper training and certification/recertification. Demonstration of proficiency and understanding of the requirements is a requisite for certification and recertification, as described in Section 2.3.

2.2 Training

2.2.1 Training for LaRC personnel usually consists of attending the workmanship training courses at NASA's Manufacturing Technology Transfer Center (MTTC) (Eastern Region), see Section 4.

2.2.1.1 In some cases, LaRC may have Level B instructors which are also allowed to train personnel. Either training method is acceptable.

2.2.2 Training shall be conducted by the proper personnel according to the hierarchy described in the certification level information provided in Section 2.4.

2.3 Certification Process

2.3.1 The supervisor shall certify and train their respective operators and inspectors

2.3.2 Certification is the act of verifying and documenting the completion of required training, including On-the-Job Training (OJT), and demonstrated specified proficiency.

2.3.3 Level A and B instructors are certified as noted in the Certification Level (Section 2.4).

2.3.4 In addition to training, specific OJT time frames are required for certain skills requiring certification, most notably Non-Destructive Testing/Non-Destructive Evaluation certifications.

2.3.5 Documentation shall be provided by the applicant to demonstrate the applicant's qualification to perform the task.

2.3.5.1 Documentation shall include:

- a. Work history (period of performance, description of equipment or operation).
- b. Signature of supervisor.
- c. The worker's specific time spent on the job performing the specific skill.

2.3.6 Other certification specialties shall require the signature of the applicant's supervisor on the certification record.

2.3.6.1 In these instances, the supervisor's signature provides evidence that sufficient OJT has been completed to certify the worker.

2.3.6.2 This certification category applies to workers for the electrical process skills or workmanship standards listed in Section P.4.

2.3.6.3 There is no mandatory OJT training required for certification/recertification.

2.3.7 Individual supervisors may establish additional OJT or training requirements as needed or deemed necessary

2.3.7.1 Individual supervisors shall document successful completion of these in the individual's certification record.

2.3.8 Personnel who perform operator or inspector tasks for any of the electrical process skills shall minimally meet the certification/recertification training requirements of Table 2-1.

Table 2-1. Workmanship Standards Training Requirements (Hours)

Discipline	Applicable NASA Standard	INITIAL CERT	RECERT	INITIAL CERT	RECERT
		<i>Operators and Inspectors</i>		<i>Level B Instructors</i>	
Polymeric Application	8739.1	32	16	40	16
Surface Mount Technology	8739.2	32	16	40	16
Soldered Electrical Connections	8739.3	40	16	56	16
Crimping, Cables, Harnesses, & Wiring	8739.4	40	16	56	16
Fiber Optic Terminations	8739.5	40	16	56	16

2.3.9 Candidate civil service personnel who meet the above criteria shall be certified by their supervisors.

2.3.10 Evidence of certification status shall be maintained by the workers/inspectors in the work area and presented to Quality Assurance personnel when requested.

2.3.11 Personnel Supervisors shall:

- a. Maintain a documented record of the worker’s training and by signature, certification.
 - (1) “A Workmanship Standards Certification Record” (LF-359) can be accessed through the LMS forms site.
 - (2) Other forms of documentation can be used as long as properly signed by the supervisor.
- b. Ensure electronics packaging design personnel are familiar with the requirements of each Workmanship Standard Training (WST) module, and other pertinent requirements of the workmanship standards.
- c. Ensure training assessments are completed for all personnel that are involved in work where the workmanship skills are or may be in the future, required.
- d. Ensure employees receive appropriate training, experience, and certification for the task performed.

- e. Review personnel's workmanship standards training/certification status yearly and ensure proficiency of employee.
- f. Approve (via signature) on LaRC forms to certify that employees have the required experience for certification.
- g. Reassign employees to duties that do not require certification when individuals fail to meet certification requirements.

2.4 Certification Levels

2.4.1 Level A NASA instructors are certified by the NASA Training and Certification Board.

2.4.1.1 Level A NASA instructors have the authority to train Level B instructors, operators, and inspectors.

2.4.1.2 Upon successful course completion, a certificate shall be issued.

2.4.2 Certification of Level B instructors shall be provided by the supplier based on successful completion of training by a Level A NASA instructor.

2.4.2.1 Level B instructors are authorized to train operators and inspectors employed at their organization and sub tier contractors.

2.4.3 Certification of inspectors shall be provided by the discipline training supplier based on successful completion of training by a Level A NASA instructor or Level B supplier instructor.

2.4.3.1 An inspector is trained and certified to inspect for conformance with the requirements of the discipline Standard.

2.4.4 Certification of operators shall be provided by the supplier based on successful completion of training by a Level A NASA instructor or Level B supplier instructor.

2.4.5 An operator is trained and certified to perform discipline tasks in conformance with the requirements of the applicable Standard.

2.4.5.1 When operators are certified to perform limited operations or processes, it shall be stated on the certification card.

2.5 Maintenance of Certification Status

2.5.1 Maintenance of certification for instructors, operators, and inspectors requires continuous proficiency.

- 2.5.1.1 Recertification of Level B instructors shall include the successful completion of retraining by a Level A NASA instructor.
- 2.5.1.2 Recertification of operators and inspectors shall include successful completion of retraining by a Level A NASA instructor or a Level B supplier instructor.
- 2.5.1.3 Recertification shall be required when:
 - a. Proficiency requirements herein are not met.
 - (1) Instructors - proficiency unacceptable.
 - (2) Operators - unsatisfactory quality of articles fabricated
 - (3) Inspectors - unsatisfactory quality of inspection.
 - (4) Quality/quantitative data demonstrates a need for recertification.
 - b. New soldering or inspection techniques have been approved that require different skills.
 - c. Work period interruption of greater than 6 months occurs.
 - d. Two years has elapsed since last certification.
- 2.5.1.4 Certification shall be revoked when:
 - a. Certificate holder fails recertification.
 - b. Employment is terminated.
 - c. The individual does not perform the NASA workmanship standard method for which the employee was certified for at least 12 months.

3. RECORDS

3.1 Maintenance of Records

3.1.1 The following records shall be maintained by the personnel supervisor, and then destroyed when no longer needed.

- a. Completed LaRC forms (i.e., Workmanship Standards Certification Record).
- b. List of any OJT required above the requirements of this document per Section 2.3.
- c. Record of equivalent work experience, if used to justify OJT.

4. TRAINING RESOURCES

4.1 Training of Level B instructors is available at either the East Coast NASA Manufacturing Technology Transfer Center (MTTC) associated with Goddard Space Flight Center (GSFC) or the West Coast NMTCC associated with the Jet Propulsion Laboratory (JPL).

4.1.1 Goddard Space Flight Center (GSFC)
NASA's Manufacturing Technology Transfer Center (MTTC) (Eastern Region)
Code 300.1
Greenbelt, MD 20771
(410) 964-7616 FAX (410) 964-7609

4.1.2 Jet Propulsion Laboratory (JPL)
NASA's Manufacturing Technology Transfer Center (MTTC) (Western Region)
MS83-204
4800 Oak Grove Drive
Pasadena, CA 91109
(818) 354-6730 FAX (818) 393-0090

4.2 Suppliers may train operator or inspector personnel in-house for certification or recertification using certified instructors and approved discipline training programs, or arrange for this training at one of the NASA-conducted schools.

4.2.1 A fee is required.

4.2.2 Contact either training center for information.

Appendix A - Definitions

A.1 Certification: Act of verifying and documenting the completion of required training, and if required, On-the-Job Training (OJT), with demonstrated specified proficiency.

A.2 Potentially Hazardous: Any operation, process, facility, or equipment that has a high potential to result in serious injury or death to personnel or damage and/or destruction of property.

A.3 On-the-Job Training (OJT): Ability to demonstrate the performance of the discipline task that requires documentation/qualification. Documentation includes previous work history and period of performance.

A.4 Personnel Supervisor: The organizational line manager who provides supervisory functions and responsibilities for employee positions requiring training and/or certification.

A.5 Recertification: The process of reconfirming the certification of an individual by training and/or proficiency test at the end of a predetermined period or when lack of proficiency dictates.

Appendix B – Acronyms

GSFC Goddard Space Flight Center

HDBK Handbook

JPL Jet Propulsion Laboratory

LaRC Langley Research Center

LMS Langley Management System

MTTC Manufacturing Technology Transfer Center

NASA National Aeronautics and Space Administration

OJT On-the-Job Training

SMAO Safety and Mission Assurance Office

STD Standard

UAV Unmanned Aerial Vehicle

WST Workmanship Standard Training