

MWI 3410.1

REVISION D

EFFECTIVE DATE: July 2, 2001

EXPIRATION DATE: July 2, 2006

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# **MARSHALL WORK INSTRUCTION**

**QS01**

## **PERSONNEL CERTIFICATION PROGRAM**

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**DOCUMENT HISTORY LOG**

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		5/14/99	Document converted from MSFC-P18.1-C01 to a Directive. Previous history retained in system as part of canceled or superseded ISO Document files.
Revision	A	8/16/99	Changed scope to limit personnel certification to work on flight or flight-associated hardware. Added requirement for disposition of records after retention period. Updated for changes due to reorganization. Clarified in paragraphs 1 and 2 that hazardous operations that do not already require certification must be evaluated by S&MA to determine if personnel certification is required.
Revision	B	11/15/99	Complete rewrite to combine safety and skills certification requirements into one instruction.
Revision	C	9/15/00	Modified paragraph 1 to clarify that the document only applies to certifications issued by MSFC. Added documents referenced in Table 1 to applicable documents list. Updated Table 1 to correct requirement errors. Added definitions for Type A and B on-the-job training (OJT). Modified Table 1 to include the appropriate type of OJT. Deleted PCH lifting operations from Table 1 since these are covered by the lifting equipment certification. Changed certification periods of numerous certifications to match OSHA requirement of three years. Added "Propellant and Explosive Inspection" to Table 1. Deleted Note 3 from Table 1. Added paragraph 6.1.2 to require notification of certification expiration 6 months in advance per MPG 3410.1 (NCRs 311 and 312). Added paragraph 6.1.4 to include certified personnel responsibilities. Included the applicable contents of MWI 3410.2 and 3410.3 in Appendices A and B. Added definitions, applicable documents, and applicable quality records from these MWI's. Modified paragraphs 6.3.2 and 6.4 to remove unnecessary requirements. CERTRAK made accessible to employees eliminating the need for certification cards. Deleted Figures 1 and 2 and included necessary requirements in paragraph 6. Added Level III experience requirements to Appendix A and modified requirement for ASNT Level III as a prerequisite for MSFC Level III. Deleted requirement from B2.1 for examiner to document training organization approval process in an organizational issuance.

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Revision	D	7/02/01	<p>Changed "Applicability" paragraph to allow issuance of MSFC skills certifications to S&amp;MA mission services contractor personnel. Added the instructions for accessing CERTRAK in the definition of CERTRAK. Modified paragraph 5.11.1 to clarify documentation for OJT Type A. Deleted last sentence in this paragraph. Modified paragraph 5.11.1 to delete reference to MSFC Form 4083-3 and substitute MSFC Form 4333. Modified paragraph 5.11.1 by deleting colon and adding commas. Added CERTRAK to paragraph 6.1.2 and deleted "through the CA," to clarify the means by which personnel and supervisors are notified when certifications are expiring. Moved paragraph 6.5 to paragraph 7. Item number 9.3, added the MSFC Form numbers 4083 and 4083-1. Deleted 9.6 and renumbered paragraphs. To the Lockout/Tagout specialty we added procedure review records. Deleted second reference to cancelled directive MWI 3410.2A dated August 3, 1999. Section 12, add MWI 3410.1C dated September 15, 2000. Modified certification specialties for: Flagman changes requirements; Changed Laser Operator to &gt; Class 3B; Modified Lifting Equipment Examiner (Proficiency Test Examiner); Modified PCH S&amp;MA Monitor to delete organization code. Added asterisks to certification specialties Propellant &amp; Explosive Inspection and Propellant &amp; Explosive User, also modified the certification period for these categories to 1 year; added new safety certifications for Inert/Asphyxiate Gases and Liquids, Hydrogen Handlers, Oxygen Handlers, and Oxygen Users. Modified note (1) to add date of training must be listed on MSFC Form 4083. Modified note number (3) to state that lockout/tagout procedures must be reviewed according to 29 CFR 1910.147. Updated NASA-STD references in the titles of MSFC-STDs listed in the applicable documents. Changed Thermography Testing to Thermal/Infrared Testing and clarified requirement. Clarified the certification requirements for NDE Level III in the definitions and in Appendix A. Combined certification requirements for plated-through hole and surface mount technology soldering in Table B-1.</p>
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## 1. PURPOSE

This Instruction establishes the requirements for the Marshall Space Flight Center (MSFC) Personnel Certification Program. It contains requirements for safety and skills certifications issued by MSFC.

## 2. APPLICABILITY

This Instruction applies to all MSFC civil service and contractor personnel at MSFC engaged in potentially hazardous operations identified in Table 1, and to MSFC civil service personnel and S&MA mission services contractor personnel who perform critical skills identified in Table 2 for flight, flight-associated hardware, or other hardware as identified by the process owner. Onsite contractor personnel will typically be certified in accordance with contract requirements that MSFC Safety and Mission Assurance (S&MA) reviews and approves (defined in the contractor's Safety and Health Plan or Personnel Certification Plan). However, all contractor employees who perform program-critical hardware (PCH) handling operations at MSFC, operate lifting equipment owned by MSFC (e.g., cranes, forklifts, and aerial lifts), or handle propellants or explosives onsite, shall be certified by the MSFC S&MA Office. Processes or operations that involve hazardous equipment or operations and are not identified herein for certification shall be brought to the attention of S&MA by the supervisor for certification evaluation.

## 3. APPLICABLE DOCUMENTS

- 3.1 29 CFR 1910, "Occupational Safety and Health Standards"
- 3.2 29 CFR 1926, "Safety and Health Regulations for Construction"
- 3.3 ANSI Z136.1, "Safe Use of Lasers"
- 3.4 MPD 1280.1, "Marshall Management Manual"
- 3.5 MPD 1840.3, "MSFC Respiratory Protection Program"
- 3.6 MPD 1860.1, "Laser Safety"
- 3.7 MPD 1860.2, "Radiation Safety Program"
- 3.8 MPG 1840.1, "MSFC Confined Space Entries"
- 3.9 MPG 3410.1, "Training"

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3.10 MSFC-RQMT-2918, "Requirements for Electrostatic Discharge Control"

3.11 MSFC-SPEC-445, "Adhesive Bonding, Process, and Inspection Requirements"

3.12 MSFC-STD-2903, "MSFC Tailoring Guide for NASA-STD-8739.3, Soldered Electrical Connections"

3.13 MSFC-STD-2904, "MSFC Tailoring Guide for NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology"

3.14 MSFC-STD-2905, "MSFC Tailoring Guide for NASA-STD-8739.4, Crimping, Interconnecting Cables, Harness, and Wiring"

3.15 MSFC-STD-2906, "MSFC Tailoring Guide for NASA-STD-8739.1, Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies"

3.16 MSFC-STD-2907, "Workmanship Standard for Printed Wiring Boards"

3.17 NSS/GO 1740.9, "Safety Standards for Lifting Devices and Equipment" (to be replaced with NSS 8719.9)

3.18 NSS 1740.12, "Safety Standards for Explosives, Propellant, and Pyrotechnics" (to be replaced with NSS 8719.12)

3.19 SNT-TC-1A-1996, "Personnel Qualification and Certification in Non-Destructive Testing"

#### **4. REFERENCES**

29 CFR Part 1960, "Basic Program Elements For Federal Employee Occupational Safety and Health Programs and Related Matters"

#### **5. DEFINITIONS**

5.1 Certification (Personnel). The act of verifying and documenting that personnel have completed required training, medical requirements as required, and have demonstrated specified proficiency.

5.2 Certifying Officer. The person designated by the S&MA Office to approve personnel for safety certification specialties/skilled operations or the person designated by the contractor to approve contractor personnel for safety certification specialties. A list of civil service and

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contractor safety certifying officers is maintained by S&MA. The S&MA certifying officer has the authority to approve certification extensions not to exceed 6 months.

5.3 CERTRAK. The S&MA software data base system used for employee certification records. CERTRAK may also be used to access personnel certifications electronically. CERTRAK is accessed via the Web through the MSFC Safety, Health and Environmental Web page. Only those employees who have a need will be issued a password allowing them to input and change data. All others to include supervisors, managers, and those who have personnel certifications, will be only allowed to view certifications and the pertinent information such as proficiency examiners and certifying officers.

5.4 Contractor Certifying Officer. The contractor employee who is authorized to issue safety certifications.

5.5 Employee and Organizational Development Department (EODD). The MSFC organization that provides civil service personnel position-related education and training.

5.6 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.

5.7 Nondestructive Evaluation (NDE) Level I. An individual certified to perform specific calibrations, specific nondestructive training (NDT), and specific evaluations for acceptance or rejection determinations according to written instructions and to record results. The Level I shall receive the necessary instruction or supervision from a certified Level II or III individual.

5.8 NDE Level II. An individual certified to set up and calibrate equipment and to interpret and evaluate results with respect to applicable codes, standards, and specifications. The Level II shall be thoroughly familiar with the scope and limitations of the methods for which certified and should exercise assigned responsibility for on-the-job training and guidance of trainees and Level I personnel. The Level II shall be able to organize and report the results of NDT.

5.9 NDE Level III. NDE Level III personnel shall be certified using ASNT criteria by an American Society for Nondestructive Testing (ASNT) authorized examination center and have the skills and knowledge to interpret codes, standards, and other contractual documents that control the methods as utilized by

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MSFC. They should select the method and technique for a specific inspection and prepare and verify the adequacy of procedures. Only Level III individuals shall have the authority to approve procedures for technical adequacy in the method they are certified. Level III individuals shall prepare detailed training course outlines, conduct training, and examine personnel in the method in which they are certified. The individual shall not make NDT acceptance of parts unless demonstration of proficiency in the specific technique was included in the practical examination of which the certification is based.

5.10 NDE Trainee. An individual who is participating in a training program for a nondestructive inspection (NDI) or NDT method and is not certified. Trainees shall not independently conduct tests; make, accept, or reject decisions; or perform any other NDI or NDT functions.

5.11 OJT Training.

5.11.1 OJT Type A: OJT for certification specialties that requires documentation to demonstrate the applicant's qualifications to perform the task. Documentation shall include: work history (period of performance, description of equipment or operation), signature of certified operator who supervised operator for 3 months, and signature of applicant. MSFC Form 4333 should be used to document any training/OJT.

5.11.2 OJT Type B: OJT for certification specialties that requires only the signature of the applicant's supervisor on the MSFC Form 4083. No minimum OJT time period is set to demonstrate proficiency. The supervisor's signature provides evidence that enough OJT has been completed to consider the applicant for certification.

5.12 Proficiency Examiner. The qualified person(s) designated to develop and administer exams necessary to achieve the desired proficiency in a specialty or skill. The examiner may also serve as the instructor. MSFC examiners review consultant training courses to ensure technical adequacy.

5.13 Provisional Certification. Provisional certifications may be issued to candidates who meet all qualifications except OJT. Basically this is a learner's permit. Provisional certifications are typically issued for up to 1 year. During this year, applicants exercise the tasks requiring safety certification, but only under the direct supervision of a certified operator, thereby receiving the necessary OJT (similar to driving a car under the supervision of a licensed driver). Upon completion of

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OJT, candidates apply for certification by mailing MSFC Form 4333, "Training Requirements Plan," or equivalent documentation to the S&MA Certification Administrator (CA). **Note:** A new physical is required if the physical submitted with the Provisional Certification is more than 1 year old.

5.14 Recertification. The process of reconfirming the certification of an individual by test or observation at the end of a period or when proficiency dictates.

5.15 Safety Certification Specialties. Specialties require safety certification as well as an official record of safety training. Safety certifications are issued to employees who have completed the required training and demonstrated the necessary knowledge and/or proficiency to ensure their ability to complete potentially hazardous operations in a safe manner.

5.16 Safety Training Specialties. Specialties for which authority documents require an official record of safety training but do not require safety certification.

5.17 S&MA Certification Administrator (CA). The S&MA person designated the administrative functions of safety and skill training/certification.

5.18 Skilled Operations. A necessary activity which is critical to the required quality level of a produced article or material.

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

5.20 Temporary Certification. Temporary certifications may be issued to candidates who meet all the qualifications except formal training. They are allowed up to 1 year maximum to complete the required training.

5.21 Training Coordinator. The person(s) in EODD designated to provide the administrative functions of training, scheduling, procurement, and documentation.

5.22 Training Data base. The data base managed by EODD where records of employee training are retained.

## **6. INSTRUCTIONS**

6.1 Certification Program Responsibilities.

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6.1.1 The MSFC S&MA Office is responsible for implementing the personnel certification program and shall maintain CERTRAK.

6.1.2 The Certification Officer reviews and approves certification packages, courses, and through CERTRAK, shall notify personnel and/or their supervisors at least 6 months prior to an existing certification's expiration date.

6.1.3 Supervisors shall:

6.1.3.1 Ensure that employees receive appropriate training, experience, and certification for the job performed.

6.1.3.2 When required, assign qualified personnel as proficiency examiners for those processes within their control and obtain approval of these personnel from the certifying officer (for MSFC safety certifications the proficiency examiner must be listed in CERTRAK before the safety certification can be approved).

6.1.3.3 Identify hazardous operations and skills to S&MA that require evaluation to determine if personnel certification is necessary, then assist as required in the evaluation and determination of certification requirements.

6.1.3.4 Concur in the necessary forms for certification including certifying that employees have the required experience for certification.

6.1.3.5 Reassign employees to duties that do not require certification when individuals fail to meet certification requirements. Notify the S&MA Certification Administrator (CA) when an employee no longer requires certification.

6.1.4 Certified personnel shall access CERTRAK, select View Employee's Certifications, and print a certification record. This printout is to be maintained on his/her person when performing the task/skill that requires certification. Personnel certified in Electrostatic Discharge (ESD) awareness for electrical devices (excludes pyrotechnics) are exempt from this requirement. ESD certification is evidenced by an ESD decal affixed to the individual's badge holders.

## 6.2 Certification Process.

6.2.1 Safety Certification. Employees performing functions listed in Table 1 shall be certified prior to performing potentially hazardous tasks. Organizations shall identify potentially hazardous tasks not listed in Table 1 for

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certification requirements evaluation. S&MA shall approve special safety training courses and certification programs; training courses to be substituted for those listed in Table 1; and contractor safety training courses and certification programs. Supervisors shall nominate for safety certification only those employees whose knowledge, skill, and experience ensure a level of proficiency that will result in safe performance of potentially hazardous operations encompassed by their job descriptions. Employees shall obtain formal training, OJT, physical examinations, and written and proficiency examinations as required by Table 1.

6.2.2 Skills Certification. Skills certification is required, but not limited to, the skills listed in Table 2. Certification for all skills/tasks must meet the requirements of the process/workmanship specification and/or the certification instruction. In the absence of established training, experience requirements, or certification intervals, the proficiency examiner will recommend to the certifying officer appropriate requirements. Other process/inspection skills may require certification. The process owners will determine the need for certification based on the difficulty of the task, the customer's requirements, and the process specification requirements. These skills will be identified to the certifying officer.

6.3 Contractor Requirements. The contractor shall evaluate potentially hazardous operations within the scope of their contract to determine if safety training and certification are required. They shall define the specialties/operations that require safety training and certification (in addition to those identified herein) within the Safety and Health Plan and/or Personnel Certification Plan which will be approved by S&MA. Contractor programs must satisfy the intent and requirements of this Instruction.

6.3.1 The contractor shall provide S&MA with the individual selected as their certifying officer for safety certifications. The contractor shall designate a safety proficiency examiner and submit the qualifications of that individual to S&MA for review and approval. Approval is noted in the CERTRAK "List of Certifying Officers" and "List of Proficiency Examiners."

6.3.2 The contractor shall ensure that affected employees receive safety training and certification. Contractors shall issue company certifications or obtain MSFC certifications for employees who were previously safety-certified by another contractor under an MSFC-approved plan 1 year from the date of new contract award.

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6.3.3 The contractor shall maintain records of OJT required for the position for as long as the employee fills that position or as long as required by OSHA, as appropriate. S&MA shall be notified when an employee no longer requires a safety certification issued by that office (e.g., retires or transfers to another job). Contractors shall maintain safety training and certification records for their employees in accordance with the requirements of their approved plan(s) and this MWI. Contractors shall apply for MSFC safety certification (via MSFC Form 4083) for the following specialties: PCH handlers; operators of MSFC-owned lifting equipment (e.g., aerial lifts, cranes, forklifts, KAMAG Transporters, etc.); onsite propellant/explosive handlers; and other specialties as identified.

## **7. NOTES**

7.1 Safety specialties and skilled operations that require training/qualification but not certification are governed by MPG 3410.1 requirements.

7.2 Certifications for the operation of MSFC lifting equipment shall be issued for the specific equipment item on which the employee demonstrated proficiency. The equipment is identified by MSFC preventive maintenance number or other MSFC identification number and requires identification on MSFC Form 4083. Where MSFC owns two or more equipment items identical in manufacturer, model number, and all functional parameters, a single proficiency examination will qualify the employee to operate all identical equipment items. Active journeyman level personnel are eligible for certification to operate all MSFC equipment items within a certification specialty (e.g., overhead cranes, mobile cranes, forklifts, etc.).

## **8. SAFETY PRECAUTIONS AND WARNING NOTES**

None

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**9. RECORDS**

The following records will be maintained by the S&MA CA and/or the employee for 10 years from the date of certification/recertification:

- 9.1 Evidence of personnel proficiency (e.g., MSFC Form 4333, exam reports, letters from training organizations, etc.) (CA).
- 9.2 CERTRAK records(CA).
- 9.3 Completed MSFC Forms 4083, 4083-1, 4083-2, and 4293 (CA).
- 9.4 List of certified personnel (CA).
- 9.5 List of proficiency examiners and certifying officers (CA).
- 9.6 NDT/NDI logbook, when required to establish experience history (employee).
- 9.7 Equivalent work experience. Refer to paragraph A2.3. (CA)
- 9.8 Lockout/tagout procedure review records

After 10 years, the records shall be maintained as historical records if the employee is still active in the specialty/skill; otherwise they shall be destroyed.

**10. PERSONNEL TRAINING AND CERTIFICATION**

None

**11. FLOW DIAGRAM**

None

**12. CANCELLATION**

MWI 3410.1C dated September 15, 2000

Original Signed by  
Sidney P. Saucier for

A. G. Stephenson  
Director

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**Table 1. Safety Certification Requirements**

CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
* Aerial Lift Operator • Boom-Supported • Bucket Truck • Vertical [1910.67; 1926.453]	• Aerial Work Platform Training (NSTC 030), Manufacturer's Course, or equivalent • Type B OJT • State Driver's License • Written & Proficiency Tests • Physical	3 Years	• Refresher Training • Physical
Asbestos Abatement for asbestos/heavy metal: • Supervisor • Worker [Alabama Asbestos Contractor Accreditation Act (89-517); 1910.1001; 1926.1101; 40 CFR]	• State Accredited Training [State Registration, Safe State (1-800-452-5928)] • Supervisor State-Accredited Course • Worker State-Accredited Course • Physical	1 Year	• State-Accredited Refresher Course • Physical
Asbestos Exposure Awareness (Class IV) [1910.1001; 1926.1101; 40 CFR]	• State Accredited Training [State Registration, Safe State (1-800-452-5928)]	1 Year	• State-Accredited Refresher Course
Asbestos Operations & Maintenance (Class III) [1910.1001; 1926.1101; 40 CFR]	• State Accredited Training [State Registration, Safe State (1-800-452-5928)]	1 Year	• State-Accredited Refresher Course
Commercial Motor Vehicle Operator (>25,000 lbs.) • Class A • Class B • Class C • Hazardous Material endorsement • Tanker endorsement • Hazardous Material/Tanker endorsement • Air Brakes restriction	• Valid Department of Transportation (DOT) Medical Card (requires physical examination; valid for 2 years) • Valid state-issued Commercial Driver License (CDL) (see Note 4)	2 Years	• Copy of renewed state-issued CDL • Copy of renewed DOT Medical Card
Confined Space Entry [1910.146 and MPG 1840.1]	• Confined Space Entry Training (AD02) • Written Test • Physical (See Note 6)	1 Year	• Refresher Training (AD02) • Physical (See Note 6)
Cryogen Handler	• Cryogenic Safety (NSTC 313) or equivalent • Physical	4 Years	• Refresher Training
* Derrick Crane Operator [NSS 1740.9]	• Derrick Crane Training Course (NSTC 208) or equivalent. • Type A OJT for PCH • Type B OJT otherwise • Physical • Written & Proficiency Examinations	3 Years	• Refresher Training • Physical • Written Test • Proficiency Test or documentation of participation in two noncritical or critical lift operations per year

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**Table 1. Safety Certification Requirements**

CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
Fall Protection [1926.503]	<ul style="list-style-type: none"> <li>• Fall Protection (NSTC 311), or equivalent</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> </ul>
Flagman [NSS 1740.9B]	<ul style="list-style-type: none"> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Physical</li> <li>• Proficiency Test</li> <li>• Completion of crane operator training courses (overhead crane NSTC205 or mobile crane NSTC208) and associated written examinations, or equivalent</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> </ul>
Flight Deck Crew	<ul style="list-style-type: none"> <li>• Appropriate FAA license and certification</li> <li>• Physical</li> </ul>	Deter- mined by FAA	<ul style="list-style-type: none"> <li>• FAA requirements</li> <li>• Physical</li> </ul>
* Forklift Operator: <ul style="list-style-type: none"> <li>• Class 1: Electric Motor, Sit-Down Rider, Counter-Balanced Trucks (Solid and Pneumatic Tires)</li> <li>• Class 2: Electric Motor Narrow Aisle Trucks (Solid Tires)</li> <li>• Class 3: Electric Motor Hand Trucks or Hand/Rider Trucks (Solid Tires)</li> <li>• Class 4: Internal Combustion Engine Trucks (Solid Tires)</li> <li>• Class 5: Internal Combustion Engine Trucks (Pneumatic Tires)</li> <li>• Class 6: Electric and Internal Combustion Engine Tractors (Solid and Pneumatic Tires)</li> <li>• Class 7: Rough Terrain Forklift Trucks</li> </ul>	<ul style="list-style-type: none"> <li>• Forklift Safety (NSTC 209) or equivalent</li> <li>• Written &amp; Proficiency Tests</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training (NSTC 210) or equivalent</li> <li>• Physical</li> <li>• Proficiency Test</li> </ul>
* Forklift (Lull Boom) Operator	<ul style="list-style-type: none"> <li>• Current certification as a Forklift Operator</li> <li>• Study of Manufacturer's Operator's Manual</li> <li>• Hands-on orientation from certified operator</li> <li>• Physical</li> <li>• Proficiency Test</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Review Manufacturer's Operator's Manual</li> <li>• Physical</li> <li>• Proficiency Test</li> </ul>

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**Table 1. Safety Certification Requirements**

CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
* Gantry Crane Operator [NSS 1740.9]	<ul style="list-style-type: none"> <li>• Gantry Crane Training Course (NSTC 205) or equivalent</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Physical</li> <li>• Written &amp; Proficiency Examinations</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> <li>• Written Test</li> <li>• Proficiency Test or documentation of participation in two critical or noncritical lift operations per year</li> </ul>
Hazardous Material Handlers (HAZWOPER) [1910.120]	<ul style="list-style-type: none"> <li>• 40-hour HAZWOPER Training Course</li> <li>• 16-hour Incident Commander Training Course</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• HAZWOPER Refresher</li> <li>• Incident Refresher</li> <li>• Physical</li> </ul>
Heavy Equipment Operator (earth-moving equipment)	<ul style="list-style-type: none"> <li>• Valid state-issued CDL, Class A or B (see Note 4)</li> <li>• Valid DOT Medical Card</li> <li>• Physical</li> <li>• Type B OJT</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Valid state-issued CDL</li> <li>• Valid DOT Medical Card</li> </ul>
High Pressure Systems (> 150 psig)	<ul style="list-style-type: none"> <li>• High Pressure System Safety Class (NSTC 315) or equivalent</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Physical</li> </ul>
* Hydraset Operator [NSS 1740.9] (Also see #31)	<ul style="list-style-type: none"> <li>• Manufacturer's Course or equivalent</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Written &amp; Proficiency Tests</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Proficiency Test</li> <li>• Physical</li> </ul>
Hydrogen Handlers/Users	<ul style="list-style-type: none"> <li>• Cryogenic Safety (NSTC 313)</li> <li>• Hydrogen Safety (NSTC 037) or equivalent</li> <li>• HazCom</li> <li>• Physical</li> <li>• Type A OJT</li> </ul>	2 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Physical</li> </ul>
Hyperbaric Chamber	<ul style="list-style-type: none"> <li>• Hyperbaric Chamber Operations Course</li> <li>• Written &amp; Proficiency Tests</li> <li>• First Aid (Red Cross)</li> <li>• CPR (Red Cross or equivalent)</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Current CPR certification</li> <li>• Physical</li> </ul>
Inert/Asphyxiate Gases and Liquids	<ul style="list-style-type: none"> <li>• Cryogenic Safety (NSTC 313)</li> <li>• Liquid Nitrogen Handlers Course (NSTC 314) or equivalent</li> <li>• HazCom</li> <li>• Physical</li> <li>• Type A OJT</li> </ul>	2 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Physical</li> </ul>

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**Table 1. Safety Certification Requirements**

CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
* KAMAG Operator/Flagman	<ul style="list-style-type: none"> <li>• KAMAG Operation Training Course (Contact S&amp;MA)</li> <li>• Valid state-issued CDL, Class A (see Note 4)</li> <li>• Valid DOT Medical Card</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Proficiency Test</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Proficiency Test</li> <li>• Physical</li> <li>• Valid state-issued CDL, Class A</li> <li>• Valid DOT Medical Card</li> </ul>
Laser Maintenance Personnel [ANSI Z136.1]	<ul style="list-style-type: none"> <li>• Laser Safety Course (AD02) or equivalent</li> <li>• Lockout/Tagout (NSTC 814)</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> </ul>
Laser Operator ( $\geq$ Class 3A) [MPD 1860.1]	<ul style="list-style-type: none"> <li>• Laser Safety Course (AD02) or equivalent</li> <li>• Written Test</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> </ul>
Laser Operator ( $>$ Class 3b or 4) [MPD 1860.1]	<ul style="list-style-type: none"> <li>• Laser Safety Course (AD02) or equivalent</li> <li>• Written Test</li> <li>• Physical</li> <li>• Initial and Exit Ophthalmology Exam</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> <li>• Initial and Exit Ophthalmology Exam</li> </ul>
* Lifting Equipment Examiner (Proficiency Test Examiner)  Forklift Mobile Crane Overhead Cranes Personnel/Aerial Lifts	<ul style="list-style-type: none"> <li>• Associated Train-the-Trainer Certified Course or equivalent when approved by MSFC Safety</li> <li>• Physical</li> <li>• Supervisor Statement verifying experience/OJT submitted to S&amp;MA for review/approval</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Associated Train-the-Trainer Recertification Course, or equivalent when approved by MSFC Safety</li> <li>• Physical</li> </ul>
Lockout/Tagout, Authorized Employee [1910.147]	<ul style="list-style-type: none"> <li>• Lockout/Tagout (NSTC 814) or equivalent</li> <li>• Written Test</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Reapplication (Note 3)</li> </ul>
* Mobile Crane Operator [NSS 1740.9]	<ul style="list-style-type: none"> <li>• Mobile Crane Operator Course (NSTC 208) or equivalent</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Written &amp; Proficiency Tests</li> <li>• Physical</li> <li>• CDL required for travel on roadway</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> <li>• Written Test</li> <li>• Proficiency test or documentation of participation in two critical or noncritical lift operations per year</li> <li>• Valid CDL and DOT medical card</li> </ul>

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CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
Mobile Sweeper Operator	<ul style="list-style-type: none"> <li>• Study of Operator's Manual</li> <li>• Valid state-issued CDL, Class A or B</li> <li>• Type B OJT</li> <li>• Proficiency Test</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Review Operator's Manual</li> <li>• Physical</li> <li>• Valid state-issued CDL, Class A or B</li> <li>• No reportable property damage incidents during prior certification period</li> </ul>
* Overhead Crane/Hoist Operator [NSS 1740.9]	<ul style="list-style-type: none"> <li>• Overhead Cranes &amp; Materials Handling (NSTC 205)</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Written &amp; Proficiency Tests</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Training</li> <li>• Physical</li> <li>• Written Test</li> <li>• Proficiency Test or documentation of participation in two noncritical or critical lift operations per year</li> </ul>
Oxygen System Handlers	<ul style="list-style-type: none"> <li>• Cryogenic Safety (NSTC 313)</li> <li>• Oxygen Systems: Operation and Maintenance (NSTC 053) or equivalent</li> <li>• HazCom</li> <li>• Physical</li> <li>• Type A OJT</li> </ul>	2 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Physical</li> </ul>
Oxygen System User	<ul style="list-style-type: none"> <li>• Fire Hazards in Oxygen Systems (NSTC 052) or equivalent</li> <li>• HazCom</li> <li>• Physical</li> <li>• Type B OJT</li> </ul>	2 Years	<ul style="list-style-type: none"> <li>• Refresher training</li> <li>• Physical</li> </ul>
* PCH - Manual Move [MWI 6410.1]	<ul style="list-style-type: none"> <li>• PCH Training (AD42) (See Note 1)</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Reapplication</li> <li>• Physical</li> </ul>
* PCH - Move Manager	<ul style="list-style-type: none"> <li>• Type B OJT</li> <li>• Course covering NASA, MSFC, OSHA, ANSI, and other standards applicable to lifting and handling operations, with written test</li> <li>• Completion of applicable crane operator training courses, riggers training course, and flagmen training course, and all associated written examinations</li> <li>• Proficiency Examination</li> <li>• PCH Training</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>

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**Table 1. Safety Certification Requirements**

CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
<ul style="list-style-type: none"> <li>• PCH - S&amp;MA Monitor</li> </ul>	<ul style="list-style-type: none"> <li>• OSHA 501</li> <li>• PCH Training (AD42)</li> <li>• S&amp;MA Critical Lift Course</li> <li>• Physical</li> <li>• Type B OJT</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• S&amp;MA Critical Lift Course</li> <li>• Physical</li> </ul>
<ul style="list-style-type: none"> <li>* PCH - Truck Driver (&gt;25,000 lbs)</li> <li>• Class A</li> <li>• Class B</li> <li>• Class C</li> <li>• Hazardous Material endorsement</li> <li>• Tanker endorsement</li> <li>• Hazardous Material/Tanker endorsement</li> <li>• Air Brakes restriction</li> </ul>	<ul style="list-style-type: none"> <li>• PCH Training (AD42)</li> <li>• Valid DOT Medical Card (requires physical examination; valid for 2 years)</li> <li>• Valid state-issued CDL (see Note 4)</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Copy of renewed State-issued CDL</li> <li>• Copy of renewed DOT Medical Card</li> </ul>
Powder Actuated Tool Operator [OSHA 1926.302e]	<ul style="list-style-type: none"> <li>Physical (able to use ear, eye, head, and face protection)</li> <li>• Training course conducted by manufacturer of tool to be certified to use (HILTI, Ramset, etc.)</li> <li>• Written Test (usually provided by manufacturer's representative) &amp; Proficiency Tests</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Review Operator's Manual for specified tool(s)</li> <li>• Physical</li> </ul>
<ul style="list-style-type: none"> <li>* Propellant &amp; Explosive Handler/ESD [NSS 1740.12]</li> </ul>	<ul style="list-style-type: none"> <li>• Explosive Handler's Course (NSTC 009) or equivalent</li> <li>• Written Test</li> <li>• Type A OJT</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>
<ul style="list-style-type: none"> <li>* Propellant and Explosive Inspection</li> </ul>	<ul style="list-style-type: none"> <li>• High school graduate</li> <li>• 3 years related education, training, and experience</li> <li>• Physical</li> <li>• 40 hours instruction in propellant and explosives; hazard mitigation, ESD, explosives safety</li> <li>• 80 hours OJT</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>
<ul style="list-style-type: none"> <li>* Propellant and Explosive User [NSS 1740.12]</li> </ul>	<ul style="list-style-type: none"> <li>• Explosive Handler's Course (NSTC 009) or equivalent</li> <li>• Explosives Safety Program Management (NSTC 010)</li> <li>• Written &amp; Proficiency Tests</li> <li>• Type B OJT</li> <li>• Physical</li> </ul>	2 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>
Radiation [MPD 1860.2]	<ul style="list-style-type: none"> <li>• Radiation Safety training (AD02)</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>

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CERTIFICATION SPECIALTY [REFERENCE]	REQUIREMENTS	CERT. PERIOD	RECERT. REQUIREMENTS
Rescue Personnel [MPG 1840.1 ]	<ul style="list-style-type: none"> <li>• First Aid</li> <li>• CPR</li> <li>• Bloodborne Pathogens (AD02)</li> <li>• Certification for specific operation supported (e.g., Confined Space Entry)</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course(s)</li> <li>• Physical</li> </ul>
Respirators (Non-SCBA) [MPD 1840.3]	<ul style="list-style-type: none"> <li>• Respirator Training (AD02)</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>
Rigger [NSS 1740.9]	<ul style="list-style-type: none"> <li>• Lift Riggers Course</li> <li>• Written &amp; Proficiency Tests</li> <li>• Type A OJT for PCH</li> <li>• Type B OJT otherwise</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> <li>• Proficiency Test or documentation of two noncritical or critical lift operations per year where rigging was required</li> </ul>
Scaffolds Competent Person [1910.28]	<ul style="list-style-type: none"> <li>• Scaffolding Safety (NSTC 312) or equivalent</li> <li>• Written Test</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> </ul>
Self-Contained Breathing Apparatus (SCBA) [MPD 1840.3]	<ul style="list-style-type: none"> <li>• SCBA Training (AD02)</li> <li>• Proficiency Training</li> <li>• Physical</li> </ul>	1 Year	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>
* Space Station Element Transportation System (SSETS) ECS Technician	<ul style="list-style-type: none"> <li>• Environmental System (ECS) Training (AD42)</li> <li>• PCH Training (AD42) (See Note 1)</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> </ul>
* SSETS INCS Technician	<ul style="list-style-type: none"> <li>• Instrumentation System (INCS) Training (AD42)</li> <li>• PCH Training (AD42) (See Note 1)</li> <li>• Physical</li> </ul>	3 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> </ul>
Wind Tunnel Operator	<ul style="list-style-type: none"> <li>• Wind Tunnel Operator's Course</li> <li>• Physical</li> </ul>	4 Years	<ul style="list-style-type: none"> <li>• Refresher Course</li> <li>• Physical</li> </ul>

**NOTES FOR TABLE 1:**

- (1) The PCH training session must be completed prior to initial certification, and date of training must be listed on MSFC Form 4083. It is not necessary to repeat this training session for PCH recertification, although some certifications (e.g., crane, forklift, rigging, etc.) necessary to perform PCH require refresher training (also see note 2).
- (2) Lifting equipment (e.g., crane, forklift, etc.) refresher courses are required every 3 years. When applying for PCH certification on lifting equipment, the applicant needs to list the last lifting equipment class on the Form 4083. If it

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has been more than 3 years since the last course, the applicant must take a refresher course.

- (3) Lockout/tagout recertification only requires refresher training when there has been a change in energy control procedures or when the authorized employee has not demonstrated a high degree of proficiency [29 CFR 1910.147, (c)(7)(iii)(A)]. MSFC-authorized applicant must submit documentation demonstrating that they have reviewed the lockout/tagout procedures in their area during the previous certification period (see 29 CFR 1910.147, (c)(6) *Periodic Inspection* for details on annual review of energy control procedures), or must complete and document refresher training.
- (4) Contact Alabama Public Safety, Drivers License (256) 539-0681 for additional information about the CDL.
- (5) Contractors must address all categories of safety certification listed above (when applicable) and must obtain NASA safety certification for the categories marked with an \*.
- (6) Failure to qualify for respirator use should be noted as a restriction by the physician, but does not render the individual ineligible for certification.

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<b>TABLE 2. <u>SKILLS THAT REQUIRE CERTIFICATION</u></b>	
<b>SKILL/TASK</b>	<b>REQUIREMENTS</b>
Penetrant Testing	Appendix A
Magnetic Particle Testing	Appendix A
Eddy Current Testing	Appendix A
Ultrasonic Testing	Appendix A
Radiographic Testing	Appendix A
Acoustic Emissions Testing	Appendix A
Thermal/Infrared Testing	Appendix A
Computed Tomography	Appendix A
Adhesive Bonding Application	MSFC-SPEC-445
Soldering including SMT	Appendix B
Staking and Conformal Coating	Appendix B
Cabling, Harnessing, and Wiring	Appendix B
Electrostatic Discharge Control	Appendix B
Crimping and Wire Wrap	Appendix B

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## APPENDIX A

### A.1 PURPOSE

This Appendix establishes the minimum requirements for the qualification and certification of MSFC personnel who perform or witness NDT for flight or flight-associated hardware using the following methods:

- a. Liquid Penetrant Testing (PT)
- b. Magnetic Particle Testing (MT)
- c. Ultrasonic Testing (UT)
- d. Radiographic Testing (RT)
- e. Eddy Current Testing (ET)
- f. Acoustic Emissions Testing (AE)
- g. Thermal/Infrared Testing (TIR)
- h. Computed Thermography (CT)

A.1.1 Exceptions. This Appendix does not apply to personnel who perform NDE for research only or who perform radiographic inspection of electrical, electronic, or electro-mechanical parts. NDE certifications issued by MSFC are not directly related to the American Society for Nondestructive Testing (ASNT) except for Level III.

A.1.2 Other Methods. This Appendix may be used to certify individuals to other methods. If certification is required, this procedure may be amended or the general guidelines may be used. In all cases, the personnel requirements of the process specification for which certification is being sought shall be met. Certification requirements for other methods shall be submitted to the certifying officer for approval.

A.1.3 Levels of Certification. The following levels of certification are established for each NDE method:

- a. NDE Level I
- b. NDE Level II
- c. NDE Level III

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A.1.4 Levels of Qualification. There shall be four levels of personnel qualification:

- a. Trainee
- b. Level I
- c. Level II
- d. Level III

## **A.2 TRAINING AND EXPERIENCE REQUIREMENTS**

Candidates for certification as Level I or Level II shall complete sufficient organized training to become familiar with the principles and practices of the applicable test method and techniques. The training shall be conducted in accordance with a course outline developed using the training course outlines of SNT-TC-1A as a guide. The training will include requirements from the specifications and procedures used to perform the method. The training shall cover basic principles, products, equipment, operating procedures and techniques, and the applicable specifications, codes, and instructions used by MSFC. After May 1998, all trainees shall maintain a logbook documenting hours of on-the-job experience for each method. The logbook shall reference work authorizing documents, test reports, and other supporting documents, as applicable.

A.2.1 Specialist Personnel. The training shall be presented by an instructor or a Level III with the exception that specialist personnel not qualified to this standard may be used to provide instruction on highly specialized topics.

A.2.2 Exams. An individual must pass a final exam in order to receive credit for a block of training hours.

A.2.3 Minimum Required Training and Experience Hours. The minimum training and experience hours for Levels I and II are given in Table A-I for a variety of NDI/NDT methods. The minimum training and experience hours for those methods not covered by Table A-1 shall be as determined by the Level III and agreed upon by the certifying officer. There are no additional training requirements to transition from Level II to Level III, nor can an individual have sufficient training to allow certification to Level III without prior certification as a Level II or performance equivalent to a Level II. One-year experience at Level II or equivalent work experience is required for candidates

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that possess a technical bachelors degree to qualify for Level III. Two-years experience is required if the candidate possesses a technical associate degree and 4-years experience is required if the candidate does not hold a degree. Equivalency of work experience shall be determined and documented by the cognizant Level III and provided to the certifying officer. Experience in multiple methods may be accumulated simultaneously.

TABLE A-1. TRAINING AND EXPERIENCE REQUIREMENTS

Examination Method	Level	Initial Training (Hours)		Experience Level (Months)
		High School Graduate or Equivalent	Completion with a Passing Grade of at Least 2 Years of Study in Science or Engineering at a College Level	
AE	I	40	32	3
	II	40	40	9
CT	I	39	29	3
	II	40	35	9
ET	I	40	24	3
	II	40	40	9
MT	I	12	8	1
	II	8	4	3
PT	I	4	4	1
	II	8	4	2
RT	I	39	29	3
	II	40	35	9
TIR <sup>3</sup>	I	40	36	3
	II	40	35	18
UT	I	40	30	3
	II	40	40	9

Notes:

(1) For Level II certification, the experience shall consist of the time at Level I or equivalent. If an individual is being initially certified at Level II without prior Level I experience, then the experience required is the sum of the experience required for Levels I and II and the training required is the sum of the training required for Levels I and II.

(2) Listed training hours may be adjusted by the examiner/certifying officer depending on the candidate's formal education level.

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(3) Level III certification in TIR requires a minimum of one semester of university level coursework in heat transfer or thermodynamics and experience developing a test plan.

A.2.4 Previous Training/Experience. Training or experience obtained from a prior employer shall be documented before it may be accepted by MSFC.

A.2.5 Equivalent Experience. For personnel certified under other qualification/certification programs, the equivalency of their previous experience to the requirements of Table A-1 will be determined and documented.

A.2.6 Experience Required for Witnessing. The experience requirements for certification to witness NDT are 1/4 of the values in Table A-1.

A.2.7 Examinations. Verification of technical qualifications of personnel shall consist of a general, specific, and a practical examination. Development of an NDT procedure may be substituted for the Level III practical exam if the individual does not perform NDT for acceptance of flight hardware. SNT-TC-1A may be used as a guide in developing examinations.

A.2.7.1 Physical. Near vision and color perception tests shall be administered prior to certification or recertification. These tests shall be documented on MSFC Form 4293. The tests will be per the following requirements:

a. Near Vision. When tested using a Jaeger #2 test chart or equivalent at not less than 12 inches, vision in one eye must be 20/20, either natural or corrected.

b. Color Perception. Distinguish and differentiate between the colors used in the method for which certification is sought.

### **A.3 CERTIFICATION**

A.3.1 Certification. Personnel who have demonstrated that they possess the appropriate qualifications shall be certified by the MSFC certifying officer in accordance with this instruction. A minimum composite score of 80 percent is required for certification. The composite score is the simple average of the general, specific, and practical exams.

A.3.2 Revocation of Certification. Certification shall be revoked when the individual does not perform NDI/NDT in the method certified for at least 12 months or the individual's performance is found to be deficient. Prior to revocation for

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deficient performance, the certifying officer shall consult with the employee's supervisor and if the two agree, the employee may be allowed to redemonstrate proficiency to prevent the certification from being revoked.

**A.3.3 Recertification.** Levels I and II personnel shall be recertified at intervals not to exceed 3 years. Level III personnel shall be recertified at intervals not to exceed 5 years. When necessary, the MSFC certifying officer may extend or limit the certification period based on recommendations of the examiner and/or the individual's supervisor. Extensions may not exceed 6 months. The physical and practical examinations, equivalent to those required for initial certification, shall be given prior to recertification. Level III personnel shall be reexamined and recertified every 5 years using ASNT criteria by an ASNT authorized examination center. Alternately and with prior approval of the certifying officer, the practical exam for Levels I and II may be replaced by a demonstration of proficiency with the results documented or by a documented audit of actual work performed.

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## APPENDIX B

### B.1 PURPOSE

This Appendix establishes the minimum requirements for the certification and/or qualification of MSFC personnel who fabricate or inspect flight or flight-associated hardware using electrical process skills (EPS) per the documents referenced herein. These requirements also apply when other program/industry documents are used that require personnel certification.

B.1.1 Exceptions. Personnel developing technology and performing research are not required to be certified.

B.1.2 EPS Categories.

B.1.2.1 Personnel performing electrical process skills are certified as either operators or inspectors to the applicable MSFC document in Table B-1. Operators are authorized to perform work on flight and flight-associated hardware, and inspectors are authorized to accept flight and flight-associated hardware.

B.1.2.2 Personnel evaluating EPS for certification are classified as examiners. Examiners should complete the same training requirements as operators/inspectors or have equivalent experience. Examiners do not need to be certified; however, they must be recognized as experts in their field. Examiners are recommended by their supervisors for approval by the certifying officer. Beginning with examiners appointed after July 1999, supervisors must submit to the certifying officer their documented credentials.

### B.2 TRAINING

B.2.1 Training Organization. Training must be obtained from an examiner-approved school. Outside agencies may be used for training subject to review and approval by the examiner.

B.2.2 Lesson Plans. Lesson plans will be developed for each training course required. The plans will include topics to be addressed, practical test specifics, and examination examples. Training contractor lesson plans will be reviewed and approved by the examiner.

B.2.3 Instructor Qualifications. Instructors must be recognized experts in their field. Instructors may be tested to requirements as determined by the certifying officer or examiner.

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#### B.2.4 Training Requirements for Initial Certification.

B.2.4.1 Personnel who perform operator or inspector tasks for any of the electrical processes must meet the initial certification/qualification requirements of Table B-1. Documented previous training and experience may be accepted for certification at the discretion of the examiner and certifying officer. Certification is required for all EPSs except PWB inspection.

B.2.4.2 Examinations. Written and practical examinations will be administered and graded by the examiner or designated representative. Copies of the examination will be retained on file. If an outside agency administers the examination, a written statement from the agency will be retained in the certification file.

B.2.4.2.1 Vision Examination. Vision and color perception tests will be administered per the applicable process document by the MSFC Medical Center personnel prior to certification. The vision tests will be administered prior to certification/recertification and shall be documented on MSFC Form 4293.

B.2.4.2.2 Written Examination. For initial certification, each candidate must score at least 80 percent on a written exam typically consisting of 25 questions. PWB inspection qualification does not require written examination.

B.2.4.2.3 Practical Examination. The candidate must pass a practical exam which is representative of the work to be performed and fully demonstrates proficiency in the skill (excluding ESD and PWB inspection). For inspectors, the practical exam may include fabrication of samples and will include an inspection test. For operators, the practical exam may include an inspection test and will include fabrication of samples. Proficiency demonstration may also be accomplished by examiner audit of actual work performed provided the audit results are documented and included in the personnel certification file.

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### B.3 CERTIFICATION

B.3.1 Candidate civil service personnel who meet the above criteria will be certified by the MSFC certifying officer upon recommendation of the examiner. Contractor personnel will be certified by the individual designated by their company.

**TABLE B-1. EPS TRAINING REQUIREMENTS (hours)**

<b>TASK</b>	<b>INITIAL CERT</b>	<b>RECERT<sup>3</sup></b>	<b>REQUIREMENT</b>
Soldering (thru-hole and Surface Mount Technology)	40	16	MSFC-STD-2903/2904 <sup>4</sup>
Cabling	28	8	MSFC-STD-2905
Crimping	12	4	MSFC-STD-2905
Conformal coating/staking	16	8	MSFC-STD-2906
ESD control	2	NOTE 2	MSFC-RQMT-2918
Wire wrap	12	12	NOTE 5
PWB inspection <sup>1</sup>	24	NOTE 2	MSFC-STD-2907

Note 1: This task requires qualification/training and does not require examination/certification/recertification.

Note 2: Retraining is required at the discretion of the examiner based on performance, new technology, etc.

Note 3: Training for recertification is required at the discretion of the examiner. Recertification may only consist of demonstration of proficiency in accordance with B3.2.1.

Note 4: Operator certification may require additional training on the exact machine used for production at the supervisor's or examiner's discretion.

Note 5: Certification is required in accordance with the applicable process specification.

B.3.2 Recertification. Recertification is required every 3 years except for ESD. ESD recertification is required when requirement violations are observed. When necessary, the MSFC certifying officer may extend or limit the certification period based on recommendations of the examiner and the individual's supervisor. Extensions may not exceed 6 months.

B.3.2.1 Demonstration of proficiency is required for recertification. This may be achieved by fabrication/inspection of samples, completion of an examiner-approved refresher training course, or by an examiner audit of actual work. Recertification may also include a written examination.

B.3.2.2 Each recertification method requires documentation to substantiate compliance. The method chosen for recertification is the responsibility of the examiner.

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B.3.2.3 Requalification for PWB inspection is required at the discretion of the examiner. The need for requalification will be based on performance.

B.3.3 Loss of Certification. Certification will be revoked under the following conditions:

B.3.3.1 Evidence of deficient performance.

B.3.3.2 Interruption of a work period for more than 6 months.

B.3.3.3 New techniques have been developed which require different skills.

B.3.3.4 Employment has been terminated.

B.3.3.5 Job function has changed and new function does not include EPS.