SAE INTERNATIONAL

AEROSPACE STANDARD

AS7489™ REV. A

Issued 2017-02
Revised 2021-10

Superseding AS7489

Standard Requirements for Aerospace Organic Coatings Applicator Certification

RATIONALE

This revision adjusts AS7489 verbiage to prepare for implementation of the initial Coatings Applicator Certification Program.

1. SCOPE

This standard establishes the minimum requirements for training, examination, and certification of aerospace coatings application personnel applying liquid organic coatings to interior structural or exterior substrates. It establishes criteria for the certification of personnel requiring appropriate knowledge of the technical principles underlying aircraft surface preparation and coatings application for both protective and decorative purposes.

Persons who successfully complete the requirements of this certification standard are considered to be able to successfully and consistently perform a broad spectrum of aerospace coatings application tasks to achieve the desired engineering purposes. This certification is not intended to determine or replace any aerospace coating operation's proprietary engineering for the depainting, preparation, or subsequent application of organic coatings materials to aircraft surfaces.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 Aircraft Maintenance Technology (AMT) Publications

Available from http://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_airframe_handbook/.

AMT Airframe Handbook Volume 1 (FAA-H-8083-31) Chapter 1 Aircraft Structures

AMT Airframe Handbook Volume 1 (FAA-H-8083-31) Chapter 8 Aircraft Painting and Finishing

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AS7489A

2.1.2 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS3095 Paint: High Gloss for Airline Exterior System

AMS3819 Cloths, Cleaning, for Aircraft Primary and Secondary Structural Surfaces

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM D2244 Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

ASTM D4285-83 Standard Test Method for Indicating Oil or Water in Compressed Air

2.1.4 Applicable Governing Agencies, Placards, and Markings Requirements

2.2 DEFINITIONS

Terms included in this document are defined as follows:

ACADEMIC TRAINING PROVIDER: The legal business entity that has the responsibility of creating and administering academic events designed to educate or train individuals to achieve the learning outcomes specified within this document.

ACAS: Aerospace Coatings Applicator Specialist

ACCREDITATION AGENCY: Nationally or internationally recognized, credible and reputable organization, dedicated to ongoing and continuous compliance with the highest standard of quality, which is authorized to grant accreditation to Academic Training Providers or Certifying Agencies.

AEROSPACE COATINGS APPLICATOR: An individual who prepares aircraft substrates (both chemically and physically) for organic coatings application, applies chemical treatments or depainting agents for coatings removal, and applies organic coatings to the interior and/or exterior of the: airframe, aircraft subassemblies, power plant components requiring coatings, aircraft fasteners and aircraft interiors requiring liquid organic coatings.

AIRCRAFT COMPONENT: Any part used in the assembly of an aircraft.

APPROVED PROVIDER'S LIST (APL): This list shall be separated into two categories: A list of approved Academic Training Providers and a list of approved Certifying Agencies. All requests for inclusion on this QPL shall be reviewed and approved by the Oversight Committee based on the requirements of this document.

CERTIFICATION: Written testimony by an accredited Certifying Agency that the individual has met the requirements of the accepted standard.

CERTIFYING AGENCY: Certifying Agency shall be a legal business entity that has responsibility for administering the certification program and issuing certificates to individuals successfully meeting the requisites in this document. Specific accreditation requirements for institutions conferring both the academic and practical examination portions of this document are defined in this document.

INSTRUCTOR: An individual that meets the requirements of the Academic Training Provider and has the necessary skills and knowledge to plan, organize, and present classroom, laboratory, or on-the-job training programs of instruction in accordance with approved course outlines. Who also is thoroughly knowledgeable with the theory and practical applications of all aerospace coatings applications as utilized by the aircraft and space transportation industry.

ON-THE-JOB TRAINING: Training, during work time, in learning equipment set up, equipment operation, repair techniques, and repair evaluation, under the technical guidance of an experienced, preferably certified, aerospace coatings applicator.

OVERSIGHT COMMITTEE: A group of the ACAS program's Primary Stakeholders formed to oversee the ACAS program. The committee's primary function shall be outlined within the organizational program document(s) in accordance with AS7489. Oversight shall include topics regarding Certifying Agencies, Training Providers, body of knowledge content, and operational aspects such as approvals, monitoring, audits, and appeals.

PRIMARY STAKEHOLDER: Persons, groups or organizations, or a combination thereof, for which the ACAS program is targeted, or for which intended outcomes are directed, or both.

PROCTOR: An individual appointed by the Certifying Agency to oversee the practical examination portion of the certification process.

PROGRAM ADMINISTRATOR: The organization that provides administrative support for the overall Coatings Applicator Certification Program, including development of the program document and formation of the Oversight Committee.

PROGRAM DOCUMENT: The specific organizational guidelines published by the program administrator exhibiting how the program meets AS7489 requirements.

QPL: Qualified Provider List. This list shall be separated into two categories: A list of approved Academic Training Providers and a list of approved Certifying Agencies. All requests for inclusion on this QPL shall be reviewed and approved by the Oversight Committee based on the requirements of this document.

QUALIFICATION: Demonstrated skill, training, knowledge, and experience required for personnel to properly perform the duties of a specific job.

SUBSTRATE: An aircraft surface such as aluminum, titanium, or composite that will subsequently receive an organic coating.

TECHNICIAN: In the context of this document, a person performing any of the tasks associated with application of aerospace organic coatings such as surface preparation, mixing, application, drying/curing, end item testing, and removal.

TRAINING: The program developed to impart the knowledge and skills necessary to meet the certification standard.

3. REQUIREMENTS

The aerospace coatings applicator certification program shall be organized with an oversight committee, certifying agents, and academic training provider(s) as shown in Figure 1. The Oversight Committee shall be formed by a Program Administrator providing organizational and administrative support for the overall program.

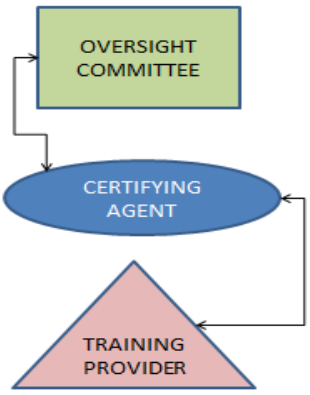

Figure 1 - Program organizational structure

3.1 Training

Prior to award of certification, personnel shall complete the minimum training as defined by this document to become familiar with principles and practices of the applicable coatings process. The trainee must be present for a minimum of 90% of instructor-led coursework or complete online coursework with an 80% or better score and complete all associated practical examinations. The training is divided into five courses. Training content by course is outlined in Appendix A.

3.2 Examinations

The written or online examination for each course shall contain a minimum of 50 multiple choice questions. Successful completion of the written exam is 80% correct answers. The examination will be closed book or in a secure online format.

3.3 Certification

Award of ACAS certification to the requirements of this standard is dependent upon successful completion of an approved ACAS training program developed or administered by an Academic Training Provider, which has been approved by a nationally or internationally recognized accreditation agency. All certification agencies accepted by the Oversight Committee must be governed by a nationally or internationally recognized accreditation agency. The Certification Agency must be approved, and in good standing, to the Oversight Committee's Approved Provider's List (APL) or Qualified Provider's List (QPL) in order for the ACAS certification to be legitimate and valid in meeting the intent of this specification. This program is designed to verify individual mastery of the minimum knowledge, skills, and abilities associated with the discipline of organic aerospace coatings application.

3.4 Currency, Training Currency for Re-Certification, and Loss of Certification

3.4.1 Currency

3.4.1.1 Certified applicators shall demonstrate continued competence every 5 years by written or online examination. A practical demonstration of specific skill sets may also be deemed necessary, as evaluated by a proctor, dispatched by an approved Certifying Agency, or directly from the Oversight Committee, granting certification renewal.

3.4.2 Training Currency for Re-Certification

3.4.2.1 A training program should include provisions for training currency prior to re-certification to continually update certified applicators on technology, materials, and other changes regarding composite maintenance and repair that would influence substrate preparation and/or coating application.

3.4.2.2 Records of the most current training shall be maintained by the Certifying Agency for a minimum of 7 years and by the individual receiving the training and certification.

3.4.3 Loss of Certification

3.4.3.1 If a certified applicator is shown to perform unsatisfactorily, certification shall be withdrawn by the issuing agency or institution under the following conditions:

3.4.3.1.1 The applicator has performed his or her duties in a manner that has created a documented safety-of-flight issue that could potentially result in, or has resulted in, a condition that places human life in imminent danger.

3.4.3.1.2 The applicator has performed his or her duties in a documented manner that proved to be negligent, and as a result, created a substantial financial liability for the employer or sponsoring organization.

3.4.3.1.3 The applicator has performed his or her duties in a documented manner that has resulted in, or could have resulted in, a safety concern to the applicator or fellow technicians.

3.4.3.2 The Oversight Committee must review and approve or deny the Stakeholder's request to revoke or suspend the applicator's certification with a majority vote within 30 calendar days.

3.4.3.3 Upon revocation or suspension of a certification, the Oversight Committee shall perform a root cause/corrective action investigation. If negligence is found on the part of the technician, a recommendation for additional training shall be provided. If the training course is found to be deficient, a recommendation for content improvement shall be submitted to the Academic Training Provider and a notification of content improvement shall be submitted to all Certifying Agencies.

3.4.3.4 If the stakeholder is on the Oversight Committee, they shall not be allowed to vote and they shall not count toward the total number on the Oversight Committee, thus not affecting the majority vote.

3.4.3.5 All written requests to revoke or suspend an applicator's certification must be submitted in writing, from the affected stakeholder to the Accrediting Agency, within 30 days of incidence.

3.4.4 Re-Certification after Loss of Certification

3.4.4.1 Remedial training and/or testing shall be required to become recertified after loss of certification. The remedial testing training or testing may be abridged from the original content but must be centric around:

3.4.4.1.1 Key, critical, theoretical principles that are specific to the particular course content to which the individual was originally certified.

3.4.4.1.2 New technology that has developed, in the specific discipline, since the last certification was achieved.

3.4.4.2 Re-certification examinations may be accomplished through any Certification Agency qualified to the Approved Provider's List and in good standing, or directly through the Oversight Committee.

4. PRACTICAL EXAMINATION REQUIREMENTS

4.1 Practical Examinations

4.1.1 Practical examinations shall evaluate technical proficiency levels, as required by this document, and demonstrated by the candidate. Practical examinations are required for all courses with the exception of Course I.

4.1.2 Practical examinations, for any course, shall be designed and dispensed in a manner that aligns with the specific engineering requirements of a candidate's organization of employment whenever possible.

4.2 Proctor Qualifications for Practical Exams

4.2.1 The Proctor must be currently certified as an Aerospace Coatings Application Specialist Instructor through an approved and accredited training institution.

4.2.2 The Proctor must have been gainfully employed, specifically in the aerospace coatings industry, for a period of no less than 5 years prior to conducting his or her first Practical Examination. Employment records shall be verified by the accrediting institution and must conform to one of the following roles:

4.2.2.1 Aerospace Coatings Applicator Specialist

4.2.2.2 Aerospace Coatings Process Supervisor/Manager

4.2.2.3 Aerospace Coatings Process Engineer

4.3 MINIMUM STUDENT REQUIREMENTS (COURSES 2 THROUGH 5)

4.3.1 Students shall meet the employment history requirements outlined in Table 1.

4.3.2 Demonstrated safe work practices. All candidates must identify where the SDS (Safety Data Sheet) is located and/or demonstrate that they can interpret it correctly and as needed. The candidate must also demonstrate conformity to all facility requirements in Section 3 of this specification.

4.3.3 Demonstrated ability to read, interpret, and apply relevant engineering specifications to each task under evaluation.

4.3.4 Demonstrated ability to select, use, and perform maintenance on all tools and engineering controls, within the facility, required to perform a given task.

4.3.5 Demonstrated ability to safely operate all facility controls that affect the coatings preparation or application process as required.

4.3.6 Demonstrated understanding of all relevant quality systems as applicable to the coatings preparation or application process.

4.3.7 All candidates must demonstrate proper solvent cleaning techniques using qualified materials as directed by commonly used aerospace material specifications.

4.3.8 All candidates must demonstrate proper alkaline (or similar aqueous) cleaning techniques and ability to assess surface cleanliness. Specifically, the student must be capable of demonstrating that he or she can achieve a water break-free surface in accordance with industry-recognized standards.

4.3.9 As applicable, all candidates must demonstrate proper viscosity measurement (Zahn or ISO) technique and maintenance, including cleaning of measurement equipment.

4.3.10 As applicable, candidates must demonstrate understanding of basic units of measure as used in aerospace coatings processes. Units of measure will be either U.S. conventional (customary) units or SI units (International System of Units).

4.4 Practical Exam Course Specific Minimum Material Requirements

4.4.1 Course II Specific Minimum Requirements

4.4.1.1 All candidates must meet the standard requirements outlined in 5.4.

4.4.1.2 All candidates must demonstrate that they can employ the skill to properly perform the abrasion process with correct form and yield a Class A surface ready for subsequent coating application. This task may be accomplished on metal alloy, composite, or a combination of substrates commonly used within the aerospace manufacturing industry.

4.4.1.3 All candidates must demonstrate the ability to successfully perform the de-painting process per the provided engineering standards. The liquid organic coating employed for this purpose shall conform to the latest version of AMS3095.

4.4.1.4 Masking application and technique, where applicable, must be observed and evaluated for each candidate.

4.4.2 Course III Specific Minimum Requirements

4.4.2.1 All candidates must demonstrate that they have the ability to perform the pretreatment process per the provided engineering.

4.4.2.2 All candidates must successfully demonstrate that they have the ability and knowledge to verify when a chemically treated aircraft surface is passivated/neutralized and ready for subsequent coatings application per the provided engineering.

4.4.2.3 All candidates must successfully exhibit the skill of identifying a variety of common corrosion forms using the specific, technical terminology to describe each form.

4.4.2.4 All candidates must successfully demonstrate how to treat or remove corrosion on an aircraft substrate using the provided, approved engineering.

4.4.2.5 All candidates must successfully demonstrate that they can identify the root causes of corrosion formation and identify the methods employed to mitigate the formation or corrosion as a part of the surface preparation process and after the aircraft has entered into service.

4.4.2.6 Masking application and technique, where applicable, must be observed and evaluated for each candidate.

4.4.3 Course IV Specific Minimum Requirements

4.4.3.1 All candidates must successfully identify the common parts of an HVLP spray gun. Additionally, candidates must demonstrate how to disassemble, clean/maintenance, and reassemble it to a 100% serviceability standard.

4.4.3.2 All candidates must successfully demonstrate how to adjust the settings on the spray gun specified by the given engineering for an aerospace coatings application. This shall include verification of air pressure at the air cap.

4.4.3.3 All candidates must successfully mix and prepare a liquid, organic coating, qualified to the latest version of AMS3095.

4.4.3.4 All candidates must successfully demonstrate proper cleaning techniques prior to coatings application on an aerospace substrate per an approved engineering source.

4.4.3.5 All candidates must successfully apply a liquid organic topcoat qualified to the latest version of AMS3095 to a properly prepared substrate.

4.4.3.6 Technique will be acutely evaluated for proper form, delivery, and results.

4.4.3.7 Masking application and technique, where applicable, must be observed and evaluated for each candidate.

4.4.4 Course V Specific Minimum Requirements

4.4.4.1 All candidates must successfully mix and prepare a liquid, organic coating, qualified to the latest version of AMS3095.

4.4.4.2 All candidates must successfully demonstrate proper cleaning techniques prior to coatings application on an aerospace substrate per an approved engineering source.

4.4.4.3 All candidates must successfully apply a liquid organic topcoat qualified to the latest version of AMS3095 to a properly prepared substrate.

4.4.4.4 Technique will be acutely evaluated for proper form, delivery, and results.

4.4.4.5 Masking application and technique, where applicable, must be observed and evaluated for each candidate.

4.4.4.6 Candidates must successfully demonstrate the ability to assess the common defects associated with the aerospace coatings process and identify root causes.

4.4.4.7 All candidates must successfully perform standard detail rework methods on a panel representative of a common substrate, coated with a material qualified to the latest revision of AMS3095, used in the aerospace industry and remediate the following coatings defects:

4.4.4.7.1 Foreign Material (dirt, lint, etc.)

4.4.4.7.2 Orange Peel

4.4.4.7.3 Overspray

4.4.4.7.4 Gravitational Defects (runs, sags, etc.)

4.4.4.7.5 Any defect where a paint blend (spot-in) is required to repair it.

4.4.4.7.5.1 *3M Aerospace Paint Defect Repair Manual, Technical Data Sheet, or a similar source may be used to outline standardized procedures for detail methods.

4.4.4.7.6 All candidates must successfully demonstrate color matching ability per ASTM D2244 for both a single stage solid color and base coat/clear coated substrate. One coating shall contain mica, metallic, or other material used for specialized effects.

4.4.4.7.7 All candidates must successfully demonstrate the ability to interpret engineering supplied drawings for the location, placement, and engineering-approved application of all applicable Governing Agencies Placards and Marking requirements for the exterior of the aircraft.

Table 1 - Student employment requirements

Course Requirement	Employment Requirement	Practical Required?
Course I (Academic)	N/A	N/A*
Course II (Academic)	1 Year (Subject to verification)	YES
Course III (Academic)	2 Years (Subject to verification)	YES
Course IV (Academic)	2 Years (Subject to verification)	YES
Course V	3 Years (Subject to verification)	YES

5. PRACTICAL EXAM FACILITY REQUIREMENTS

5.1 Any facility used for the purpose of evaluating the technical skills of an ACAS candidate shall be compliant to all local and federal laws that govern the use of hazardous materials application and disposal.

5.2 Immediately prior to the beginning of any practical examination; a safety audit shall be conducted and documented to verify that the testing facility, as well as all equipment to be used, meets all OSHA standards to provide a safe and hazard free test environment.

5.3 The facility shall have a preventative maintenance program in place that is current, per the documented process, and compliant to the requirements specified by all equipment manufacturers or internal engineering standards.

5.4 For all applied aqueous chemical processes, the water quality shall conform to the requirements specified by the technical data sheet representative of a given material or the approved proprietary engineering documents.

5.4.1 Water quality shall be verified and documented, along with verification method employed, prior to the practical examination.

5.5 Airflow rate through filtered media, for the capture of volatile organic compounds (VOC) or other exhaust, shall be verified and documented immediately prior to the practical examination using a calibrated anemometer or through other built-in detection devices.

5.5.1 Filter banks shall be inspected to ensure all filters are properly installed per the manufacturer's recommendation.

5.6 Relative humidity shall be verified and documented using a calibrated psychrometer or other built-in detection device immediately prior to or during the practical examination.

5.7 Temperature shall be verified and documented using calibrated instruments (either built-in or hand-held) designed for this purpose immediately prior to and during the practical examination.

5.8 Illuminance

Lighting shall not be less than 100 foot-candles or 1076.39 lux at any time during the practical examination. Lighting shall be verified and documented immediately prior to the examination using a calibrated light meter.

6. ACCREDITATION FOR TRAINING AND EXAM PROVIDERS

6.1 Academic Training Providers and/or Certifying Agencies (Practical Examination Providers)

All Certifying Agents shall be governed by a nationally or internationally recognized Accreditation Agency prior to submitting an application to the AS7489 Oversight Committee.

It shall be the Certifying Agents primary responsibility to approve training providers based upon the requirements identified within AS7489 and the program document. Certifying Agencies must have verifiable approval from a national or international accreditation source.

6.1.1 Accreditation of the Academic Training Provider and Certifying Agency must be maintained as current and in good standing.

6.1.2 The Oversight Committee shall maintain a Qualified Provider List (QPL) of Certifying Agencies who meet full approval in ensuring that the intent of this document is met at all times.

6.1.3 The Oversight Committee will audit and approve all Certifying Agencies to determine if requirements of this standard are met. Upon approval, they will be added to the QPL.

6.1.4 The Certifying Agency will audit each permanent location operated by their approved training providers per their established protocol in accordance with the program document.

6.1.5 The Oversight Committee will audit approved Certifying Agencies at a minimum of every 3 years to ensure compliance with this standard.

6.1.6 If an approved Certifying Agency desires a change in curriculum or exam, the Oversight Committee must audit and approve the change prior to implementation.

6.1.7 If an approved Certifying Agency has a change in ownership, the Oversight Committee must audit the Certifying Agency within 6 months of the change of ownership.

6.1.8 Certifying Agencies (Practical Exam Providers) must provide documentation to the Oversight Committee ensuring all Proctors meet the minimum requirements of 5.3.

7. RECORDS

7.1 The Certifying Agency or their designee shall maintain training records for as long as certification is in effect. Such records shall be retained and available for a minimum of 7 years.

8. NOTES

8.1 Revision Indicator

A change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

PREPARED BY AMS COMMITTEE “G-8”

APPENDIX A

A.1 TRAINING REQUIREMENTS

A.1.1 Training Content Development/Provider Requirements

A.1.1.1 Training content/programs developed or administered directly by the technician's employer shall not be eligible to confer ACAS certification.

A.1.1.2 Training Departments, operating within the Technician's place of employment, may coordinate Certification Training or Practical Examinations with third party training Providers that meet the accreditation requirements of this specification.

A.1.1.3 Training programs that have been prepared by a third-party training provider and meet the intent of this document may be implemented, as well as dispensed, by an Employer's Training Department to meet the academic requirements as outlined in this document. All testing (including practical examinations), however, must be conducted under the direct supervision of an approved/accredited third-party training institution's designated proctor or online instructor.

A.1.1.4 All training material content, designed to prepare technicians for ACAS certification in, any of or all of, the technical disciplines outlined within this standard must satisfy the minimum core competencies as provided in this standard.

A.1.1.5 If a practical examination for any course is administered, by an accredited source, in a public offering then it shall conform to this standard.

A.1.1.6 Training content may reference specific products for training purposes but shall not be designed in a manner that is intended to create product biases among students or candidates participating in any approved course leading to ACAS certification.

A.1.2 Five courses taught by an accredited source will be required for full certification to be recognized and conferred to the aerospace applicator. The required courses shall be classified as follows:

A.1.2.1 Course 1: Course 1 requires knowledge of general principles, but no practical application, no development of manipulative skill; and instruction by lecture, demonstration, and discussion of this specification. This course requires classroom-based learning (online or instructor-led) but does not require any practical application assessment. Teaching aids or instructional equipment may include charts, books, diagrams, or other visual teaching aids. Students, who successfully complete Course 1, per the provisions of this document, will be eligible to receive a Certification upon successfully completing a written examination, consisting of a minimum of fifty multiple choice questions, with a score of 80% or above. The examination will be overseen by a proctor provided by the Certifying Agency.

A.1.2.2 Courses 2 through 4: Course 2, 3, and 4 require specific theoretical knowledge of applicable principles, and the ability of the student to perform an intensive practical application demonstrating the skill set relevant to the specific course discipline. The theoretical portion of this training may be dispensed through online or instructor-led venues and there shall be a practical exam to verify required skill levels relative to each course discipline. Students, who successfully complete Courses 2 through 4, per the provisions of this document, will be eligible to receive a certificate of completion from an approved/accredited institution of learning. A certificate to verify competency for successful completion of the practical exam associated with the given discipline shall be granted by the approved Certifying Agency as described in this document.

A.1.2.3 Course 5: Course 5 shall serve as the Aerospace Coatings Applicator Specialist Mastery Course. Upon successful completion of all Course 5 requirements; both academic, through an online or an instructor-led venue, as well as an intensive practical examination of all core critical skills, the student shall be eligible to receive a full certification as an Aerospace Coatings Applicator Specialist (ACAS) and may be conferred a technical certification that verifies the aforementioned knowledge, skills, and abilities.

A.2 ACADEMIC COURSE CONTENT REQUIREMENTS

A.2.1 All academic courses, in addition to specific technical competencies, shall contain the following subcategories in a manner that is salient to the respective content:

A.2.1.1 Safety

A.2.1.2 Housekeeping

A.2.1.3 Facilities and Maintenance

A.2.1.4 Engineering

A.2.1.5 Quality

A.3 COURSE OVERVIEW

A.3.1 Course 1 - Entry Level Course

A.3.2 Course 2 - Surface Prep including De-Painting

A.3.3 Course 3 - Corrosion Inhibitors

A.3.4 Course 4 - Top Coat

A.3.5 Course 5 - Detail including Master Certification upon Completion of all five Courses

A.4 COURSE 1 - ENTRY LEVEL

A.4.1 Safety

A.4.1.1 Understanding Hazardous Chemicals used in Aerospace Prep

A.4.1.2 Typical Exposures and Effects (Solvents, Hexavalent Chromium, Dust…)

A.4.1.2.1 Methods of Entry into Body

A.4.1.2.2 Physical Effects

A.4.1.2.3 P.E.L. - Personal Exposure Limits

A.4.1.2.4 P.P.E. - Personal Protection Equipment

A.4.2 Housekeeping

A.4.2.1 Cleanliness Leads to a Safe Working Environment

A.4.2.2 Foreign Material Mitigation and Overall Process Mitigation

A.4.2.3 Defects Associated with Compromised Prep/Paint Environment

A.4.3 Facilities Quality Checks

A.4.3.1 Checks and Requirements for Air Sources (Filtration Systems and Air Quality Checks) per ASTM D4285-83

A.4.4 Checks and Requirements for Water Supply (Deionized, Reverse Osmosis and Quality Checks)

A.4.5 NESHAP/6H

A.4.5.1.1 EPA Requirements

A.4.5.1.1.1 Compliance

A.4.5.1.1.1.1 Compliance Dates

A.4.5.1.1.2 Exemptions

A.4.5.1.1.3 Training

A.4.5.2 V.O.C. Definition and Coatings Manufacturer Requirements

A.4.5.2.1 Application (Technician Training and Execution)

A.4.5.2.2 Facilities Requirements (Booth Design, Booth Filters, Booth Pressure, Paint Guns)

A.4.6 Engineering

A.4.6.1 Primary Source (Drawings, MIL Specs, AMS, ASTM, BMS, etc.)

A.4.6.2 Secondary Source (Work Instructions, TDS, MSDS/SDS, etc.)

A.4.6.3 Importance of following (Accountability, Traceability)

A.4.7 Surface Energy – Substrate Cleaning

A.4.7.1 Organic and Inorganic Contaminant

A.4.7.2 Surfactants and Effects on Adhesion

A.4.8 Surface Prep

A.4.8.1 Abrasion

A.4.8.2 Cleaning – Types of Cleaning Agents

A.4.8.2.1 Acid Based

A.4.8.2.2 Solvent Based

A.4.8.2.3 Alkaline Based

A.4.9 Coatings

A.4.9.1 Conversion Coatings

A.4.9.1.1 Chromated

A.4.9.1.2 Non-Chromated

A.4.9.1.3 Electrochemical (Anodize)

A.5.4 NESHAP/6H

A.5.4.1 EPA Requirements

A.5.4.1.1 Compliance

A.5.4.1.1.1 Compliance Dates

A.5.4.1.1.2 Exemptions

A.5.4.1.1.3 Training

A.5.4.2 V.O.C. Definition and Coatings Manufacturer Requirements

A.5.4.2.1 Application (Technician Training and Execution)

A.5.4.2.2 Facilities Requirements (Booth design, Booth Filters, Booth Pressure, Paint Guns)

A.5.5 Engineering

A.5.5.1 Primary Source (Drawings, MIL Specs, AMS, ASTM, BMS, etc.)

A.5.5.2 Secondary Source (Work Instructions, TDS, MSDS/SDS, etc.)

A.5.5.3 Importance of Following (Accountability, Traceability)

A.5.6 Surface Energy – Substrate Cleaning

A.5.6.1 Organic and Inorganic Contaminant

A.5.6.2 Surfactants and Effects on Adhesion

A.5.7 Substrates

A.5.7.1 Types

A.5.7.1.1 Aluminum Alloys, Composite (FRP, CFRP GRP), Titanium, etc.

A.5.7.1.1.1 Abrasion Techniques based on Substrate, Choice of Abrasion Media and Grit

A.5.7.1.1.2 Corrosion and Dissimilar Metal Effects (Types of Corrosion and Causes during Surface Prep)

A.5.7.1.1.3 Surface Cleaning (Solvent Wash, Etch, Passivation)

A.5.7.1.2 Composite

A.5.7.1.2.1 Embedded Conductive Mesh

A.5.7.1.2.1.1 Purpose

A.5.7.1.2.1.1.1 Lightning Strike

A.7.4.2 V.O.C. Definition and Coatings Manufacturer Requirements

A.7.4.2.1 Application (Technician Training and Execution)

A.7.4.2.2 Facilities Requirements (Booth Design, Booth Filters, Booth Pressure, Paint Guns)

A.7.5 Engineering

A.7.5.1 Primary Source (Drawings, MIL Specs, AMS, ASTM, BMS, etc.)

A.7.5.2 Secondary Source (Work Instructions, TDS, MSDS/SDS, etc.)

A.7.5.3 Importance of Following (Accountability, Traceability)

A.7.6 Surface Energy – Substrate Cleaning

A.7.6.1 Organic and Inorganic Contaminant

A.7.6.2 Surfactants and Effects on Adhesion

A.7.7 Substrates

A.7.7.1 Aluminum Alloys, Composite (FRP, CFRP GRP), Titanium, etc.

A.7.7.1.1 Abrasion Techniques based on Substrate, Choice of Abrasion Media and Grit

A.7.7.1.2 Corrosion and Dissimilar Metal Effects (Types of Corrosion and Causes during Surface Prep)

A.7.7.1.3 Surface Cleaning (Solvent Wash, Etch, Passivation)

A.7.7.2 Composite

A.7.7.2.1 Embedded Conductive Mesh

A.7.7.2.1.1 Purpose

A.7.7.2.1.1.1 Lightning Strike

A.7.7.2.1.2 Alloys in use

A.7.7.2.1.2.1 Copper

A.7.7.2.1.2.2 Anodized Aluminum

A.7.7.2.1.3 Precautions during Abrasion Process

A.7.7.2.1.3.1 Refrain from Abrading through Encapsulating Epoxy Resin and Exposing Conductive Mesh

A.7.7.2.1.3.2 How Excessive DFT effects Lightning Strike Protection

A.7.8 Mixing of Coatings

A.7.8.1 Proper Agitation prior to Mixing

A.7.8.1.1 Refer to TDS for Agitation Instructions (many are different)

A.7.8.2 Following Recommended Mix Ratio

A.7.8.2.1 Inherent Problems with Non-Compliance (Tech Playing Chemist)

A.7.9 Thorough Mixing of Blended Components

A.7.9.1 How does the Technician know when you have a Homogenous Admixed Coating per the MFG TDS?

A.7.9.1.1 Failure Modes

A.7.9.1.2 Effects

A.7.10 Zahn

A.7.10.1 Where to find Correct Zahn Cup and Time in Seconds per MFG TDS or Proprietary Engineering?

A.7.10.2 Understanding of Correct Zahn Procedure

A.7.10.3 Importance of Verifying Zahn

A.7.10.3.1 Failure Modes

A.7.10.3.2 Effects

A.7.10.4 Environmental Impact to Zahn Readings

A.7.11 Induction Time

A.7.11.1 Why Necessary

A.7.11.2 Environmental Impacts to Induction Times

A.7.11.3 Failure Modes for Non-Compliance

A.7.12 Paint Gun Operation

A.7.12.1 Gun Setup (HVLP)

A.7.12.1.1 Measuring Air Cap Pressure

A.7.12.1.2 Gun Adjustment Settings (what is the proper setting?)

A.7.12.2 Electrostatic Paint Guns

A.7.12.2.1 How do they work?

A.7.12.3 Pressure Pots

A.7.12.3.1 Basic Setup