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Program Document CPBOK

PD 6103

CPBok-15-PL-2 REV. A

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BODY OF KNOWLEDGE:

ROLE DESCRIPTION: PLANNER
SPECIAL PROCESS: CHEMICAL PROCESSING
METHOD: CONVERSION/PHOSPHATE COATINGS

All PRI Qualification[SM] program examinations are created using the applicable PRI Qualification[SM] program Body of Knowledge (BoK), which defines the baseline knowledge and experience required to be considered competent to perform the specified job role in aerospace special process manufacturing.

All BoKs are created by subject matter experts who participate in the PRI Qualification[SM] Body of Knowledge Review Boards. All BoKs are updated periodically according to the latest revision of PRI Qualification[SM] program documentation (PD6100: Industry Managed Special Process Bodies of Knowledge) to ensure consistency with current industry practice.

1. INTRODUCTION

This document has been created by the PRI Qualification[SM] program Chemical Processing Body of Knowledge Review Board (CP-BoKRB) according to the requirements of PD6100.

This document constitutes the PRI Qualification[SM] program BoK for Chemical Processing: Conversion/Phosphate Coatings for Planner Level. It defines the baseline knowledge and experience required to be considered competent to perform this role.

Unless otherwise stated, the CP-BoKRB has followed guidelines as detailed in the current revision of International Aerospace Quality Group IAQG Guidance PCAP 001 (Competence Management Guideline) to develop this BoK.

The information in this BoK will provide guidance for the following:

- Training providers who wish to develop training courses intended to support PRI Qualification[SM] program examination candidate preparation
- Chemical Processing Examination Review Board (CP-ERB) for the development of PRI Qualification[SM] program examinations
- Candidates taking PRI Qualification[SM] program examinations who wish to prepare in advance

2. REFERENCES

PRI Qualification[SM] program documents:

PD6000	Governance & Administration of PRI Qualification[SM] Program
PD6100	Industry Managed Special Process Bodies of Knowledge
PD6200	Industry Managed Special Process Examinations System

IAQG documents:

IAQG Guidance PCAP 001 Competence Management Guideline

3. DEFINITIONS

Definitions described within are specific to the Special Process BoK. For program-specific definitions, please refer to either the PD 6000 or the PRI Qualification[SM] Dictionary.

BODY OF KNOWLEDGE (BoK): Baseline knowledge and experience required to be considered competent for a target position.

GENERAL EXAMINATION: The General Examination is designed to ascertain the candidate's general knowledge required for a particular job, role or activity. All of the questions will be derived from the corresponding BoK.

EXPERIENCE: The accumulation of knowledge or skill that results from direct participation in events or activities over a period of time.

KNOWLEDGE: Information / understanding acquired over a period of time. Information acquired through study and retained over that period of time (education, training, experience etc.) The combination of data and information, to which is added expert opinion, skills and experience, to result in a valuable asset which can be used to aid decision making and problem solving.

LEVEL: A class or division of a group based on education, training and experience. There are 3 levels: Operator/Technician, Planner and Owner. Please refer to the current revision of PD 6000 for definitions.

METHOD: A well-defined division of a SPECIAL PROCESS widely recognized by industry. A specific area of a special process for example anodizing within Chemical Processing

NON-SPECIAL PROCESS RELATED REQUIREMENTS: Miscellaneous requirements such as Health and Safety, Environmental, etc.

PERSONAL ATTRIBUTES: A quality or characteristic expected and required for a particular job, role or activity.

PRACTICAL EXAMINATION: The Practical Examination shall consist of a demonstration of proficiency in performing tasks that are typical of those to be accomplished in the performance of the candidate's duties. The examination content is derived from the corresponding BoK.

SKILL: Ability to perform a particular task. The quality of being able to do something that is acquired or developed through training or experience.

SPECIFIC EXAMINATION: The Specific Examination shall cover requirements and use of the specifications, codes, equipment, operating procedures and test techniques the candidate may use in the performance of his/her duties with the employer. Examination content will be derived from the corresponding BoK where applicable.

WEIGHTING: The "weighting" of each line item, using a scale of 1, 3, 7, 10, (1 being least important; 10 being most important) indicates the relative importance of that aspect of the BoK and will determine the likelihood and frequency of a question on that topic appearing in the examination.

4. GUIDANCE TO EXAMINATION CANDIDATES

All PRI Qualification[SM] program examination candidates are recommended to read all documents referenced in section 2 of this document.

As stated in PRI Qualification[SM] program document PD6200, every exam question shall relate directly to and be derived from the information as detailed in the current revision of the BoK.

Re-assessment of candidates to this BoK is required every **5** years, unless otherwise specified.

Candidates are therefore advised to ensure familiarity with all aspects of the BoK as detailed in Table 1. This can be done through:

- Self-study
- Completion of internal training
- Completion of external training (a list of Approved Training Providers can be found at https://p-r-i.org/)

Records of all qualified personnel shall be maintained and include:

- Date of Qualification
- Results of Written Exam
- Results of Practical Exam (if applicable)
- Summary of Experience (Owner level only)

5. LEVELS

Level			
Descriptors	***Operator (OP)/Technician(T)*** ***For descriptions, please refer to current version of PD6000***	***Planner (PL)*** ***For descriptions, please refer to current version of PD6000***	***Owner (OW)*** ***For descriptions, please refer to current version of PD6000***
Conversion/Phosphate Coatings Specific Criteria	**No additional criteria for conversion/phosphate coatings.**	**No additional criteria for conversion/phosphate coatings.**	**No additional criteria for conversion/phosphate coatings.**
Technical Knowledge	Basic knowledge of the special process, its main processes, methods and tools.	Good level of knowledge in all aspects of the special process, all its processes, methods and tools. Ability to coach others on contents and methods in the context of their workplace.	High or extensive knowledge in all aspects of the special process, all its processes, methods and tools to assess and validate improvements. Able to contribute to set externally recognized standards. Ability to define contents and methods for using knowledge effectively in influencing and developing international processes. Ability to influence the process with one's knowledge.
Experience	Sufficient experience to deal with recurrent activity.	Has enough experience to deal with unforeseen issues.	Wide proven experience of the subject. Is recognized specialist within the special process.
Personal Attributes	Takes into consideration behavioral characteristics such as but not limited to: team working, communication, direction and purpose, innovation and problem solving, mutual trust and respect, confidentiality and trustworthiness.		
Skills	Describes the activities necessary to perform each level of job function to comply with the Body of Knowledge		
Non-Special Process Related Requirements	Health & Safety, Environmental, Quality System Requirements.		

6. TABLE 1

ROLE DESCRIPTION: Planner
SPECIAL PROCESS: Chemical Processing
METHOD: Conversion/Phosphate Coatings
REFERENCE GUIDELINES: ***Addendum 1 is a list of the International Standards and Reference Documents applicable to Conversion/Phosphate Coatings processes.***

Row #	COMPETENCE	Weight (1,3,7,10)	Exam Type Written/ Practical	Reference Guidelines
	KNOWLEDGE: The basic knowledge of the special processes, methods and tools			
	GENERAL KNOWLEDGE			
1.	Understand how to determine if there has been damage to the part surface.	**10**	**Written**	**AC7108**
2.	Full and complete understanding of Internal Work instructions.	**10**	**Written**	**AC7108**
3.	Know how to access customer specifications and requirements (i.e. where to find them).	**10**	**Written**	**AC7108**
4.	Understand how to interpret customer specification and requirements in the context of performing the Conversion Coating process.	**7**	**Written**	**AC7004; AS9100; AC7108/11**
5.	Understand how to interpret Industry Standards (see Addendum 1 of this document).	**7**	**Written**	**Addendum 1**
6.	Knowledge and understanding of the accept/reject criteria for Conversion Coating, including thickness, appearance and corrosion resistance.	**10**	**Written**	**AC7108; AC7108/11**
7.	Knowledge of the surface preparation procedures.	**10**	**Written**	**AC7108; AC7108/11**
8.	Have an awareness of the basic control and calibration requirements for equipment.	**7**	**Written**	**AC7004; AS9100**
9.	Know how to perform the Water Break Free Cleanliness Verification.	**7**	**Written**	**AC7108; AC7108/11**
10.	Knowledge and understanding of mathematics, including decimal and fractions.	**10**	**Written**	**General Industry**
11.	Know how to use precision measuring instruments and equipment.	**7**	**Written**	**AC7108; AC7108/11**
12.	Know and understand job documentation including awareness of fixed and frozen process requirement.	**10**	**Written**	**AC7004; AS9100; AC7108**
13.	Know and understand proper chemistry, both usage and application.	**10**	**Written**	**General Industry**
14.	Know and understand the surface preparation requirement prior to conversion coating including general cleaning, mechanical cleaning and chemical cleaning.	**10**	**Written**	**AC7108/11; MIL-DTL-5541; MIL-DTL-16232**
15.	Know and understand laboratory procedure.	**7**	**Written**	**AC7108**
16.	Know and understand analytical requirements and limits.	**7**	**Written**	**AC7108**
17.	Know and understand how to review and take action on analytical data and limits.	**7**	**Written**	**AC7108**
18.	Understand the mechanics and importance of racking, part set-up and masking.	**7**	**Written**	**AC7108; AC7108/11**
19.	Understand the need for pre-process checks (such as calibration status and solution temperatures) and understand proper verification methods.	**7**	**Written**	**AC7108**
20.	Knowledge and ability to write and review internal procedure and practices.	**10**	**Written**	**AC7108/11**
21.	Know how to recognize unsafe and/or inappropriate work practices.	**7**	**Written**	**AC7108; ISO14001; OHSAS18001**
22.	Know and understand the importance of cleanliness of the work area.	**10**	**Written**	**AC7108**
	CONVERSION PHOSPHATE COATING			
23.	Understand the importance of temperature control for the conversion coating process and the need for the tank solution to be at the correct temperature before immersion of parts.	**10**	**Written**	**AC7108; AC7108/11**
24.	Know and understand how to correct and adjust the tank solution temperature for the conversion coating process.	**10**	**Written**	**AMS2473; AMS2475; AMS2477; AMS2480; AMS2481; AMS2485; AMS2486; MIL-DTL-5541; MIL-DTL-16232; MIL-DTL-13924; ASTM B117; ASTM**
25.	Understand the significant of pH and grades of water purity and their measurement.	**10**	**Written**	
26.	Understand how to deal with incorrect or inappropriate conversion coating.	**10**	**Written**	
27.	Know and understand how to review and take action on conversion coating test result data.	**7**	**Written**	
28.	General knowledge and understanding of the conversion coating process including chemical, masking, tanks condition, work environment etc.	**10**	**Written**	
29.	Know and understand about the selection of appropriate jigging equipment for use in the conversion coating process.	**7**	**Written**	
30.	Know and understand the key conversion coating test procedures such as water break free, visual, thickness, salt spray, tape adhesion etc.	**7**	**Written**	

31.	Thorough understanding of the conversion coating process and an awareness of the different types of chemicals.	**7**	**Written**	**D3359; MIL-DTL-81706**
32.	Know uses, features and applications for conversion coating.	**7**	**Written**	
33.	Understand the application requirements for conversion plating.	**10**	**Written**	
34.	Understand the limitations for conversion coating.	**7**	**Written**	
35.	Understand the technical data sheets for the chemicals used in conversion coating.	**7**	**Written**	
36.	Be aware of substrate requirements for conversion coating.	**7**	**Written**	
37.	Know the pre-cleaning and cleaning steps and restrictions for conversion coating.	**7**	**Written**	
38.	Understand "Accept & Reject" Criteria and testing for conversion coating.	**7**	**Written**	
39.	Understand how to identify which features require conversion coating, masking etc. as required by governing engineering documents.	**7**	**Written**	
40.	Understand the environmental, worker safety and health concerns associated with conversion coating.	**7**	**Written**	
41.	Knowledge of effect of temperature on conversion coating properties and temperature limitations for drying.	**7**	**Written**	
42.	Knowledge of limitations allowed for post-treatment rework.	**7**	**Written**	
43.	Knowledge and ability to perform post-treatment touch-up.	**3**	**Written**	
	SKILLS: Defined within these rolls describes the range of skills. The skills required to perform a particular special process task			
	READ AND UNDERSTAND WRITTEN INSTRUCTIONS:			
44.	Ability to understand specification requirements and customer flow-down requirements.	**10**	**Written**	**AC7004; AS9100; AC7108**
45.	Apply conversion coating techniques appropriately.	**3**	**Written**	**AC7108; AC7108/11**
46.	Verify and validate the conversion coating results.	**3**	**Written**	**AC7108; AC7108/11**
47.	Properly report non-conformances.	**10**	**Written**	**AC7004; AS9100; AC7108**
48.	Apply technical knowledge in a skillful way when solving problems.	**10**	**Written**	**AC7004; AS9100; AC7108**
49.	Be familiar with the scope and limitations of conversion coating.	**10**	**Written**	**AC7108; AC7108/11**
50.	Use of appropriate equipment for the conversion coating process.	**7**	**Written**	**AC7108; AC7108/11**
51.	Ability to follow instructions.	**10**	**Written**	**AC7004; AS9100; AC7108**
52.	Interpretation of an acceptable conversion plating process.	**10**	**Written**	**AC7108; AC7108/11**
53.	Must be able to read drawings and specifications.	**10**	**Written**	**AC7004; AS9100; AC7108**
54.	Must be able to interpret specification requirements.	**10**	**Written**	**AC7004; AS9100; AC7108**
55.	Must be able to set-up operations (equipment, rates, timers and temperatures) including alternate procedures as appropriate.	**10**	**Written**	**AC7004; AS9100; AC7108**
56.	Must be able to understand and interpret shop travelers.	**10**	**Written**	**AC7004; AS9100; AC7108**
	SEQUENCING			
57.	Has an appropriate understanding of where this process falls in the sequence of events.	**10**	**Written**	**AC7004; AS9100; AC7108**
	PERSONAL ATTRIBUTES: Are statements that will enable judgment of the person's personal attributes			
58.	Be able to work independently with a minimum of supervision.	**10**	**NA**	**General Industry**
59.	Must have a high degree of integrity.	**10**	**NA**	**General Industry**
60.	Be attentive to details.	**10**	**NA**	**General Industry**
61.	Be flexible.	**7**	**NA**	**General Industry**
62.	Tolerate stress.	**7**	**NA**	**General Industry**
63.	Exhibit conflict resolution.	**7**	**NA**	**General Industry**
64.	Decision making ability.	**10**	**NA**	**General Industry**
65.	Team worker.	**10**	**NA**	**General Industry**
66.	Ethical behavior.	**10**	**NA**	**General Industry**
67.	Exhibit Leadership.	**7**	**NA**	**General Industry**
	EXPERIENCE: Are the minimum experience requirement expected to demonstrate their competence.			
	EDUCATION			
68.	High School Diploma or GED or Secondary Education.	**10**	**NA**	**General Industry**
69.	Apprenticeship.	**3**	**NA**	**General Industry**
70.	Industry Training or Courses.	**3**	**NA**	**General Industry**

	TRAINING / HANDS-ON EXPERIENCE			
71.	Completed on the job training: Minimal number of hours for Planner – 160 hours.	**10**	**NA**	**General Industry**
	NON-SPECIAL PROCESS RELATED REQUIREMENTS: Defined within these rolls are other general or pre-requisite needed			
72.	General understanding of Quality Systems AS/EN/JISQ 9100 or AC7004 or equivalent.	**10**	**Written**	**AS/EN/JISQ 9100; AC7004**
	SAFETY & ENVIRONMENTAL REQUIREMENTS:			
73.	Knowledge and understanding of safety and handling of hazardous material, chemicals, etc. including safe storage, interpretation of Health & Safety Data Sheets and Regulatory Requirements.	**10**	**Written**	**AC7108; ISO 14001; OHSAS 18001**
74.	Understand Safety Data Sheets (SDS) and Personal Protective Equipment Requirements: When and how to use appropriate personal protective equipment (googles, gloves, rubber boots, aprons, etc.).	**10**	**Written**	**AC7108; ISO 14001; OHSAS 18001**
75.	Understand which personal protective equipment to use, when and why.	**10**	**Written**	**AC7108; ISO 14001; OHSAS 18001**
76.	Understand the safe storage, shelf life and mixing of chemicals.	**10**	**Written**	**AC7108; ISO 14001; OHSAS 18001**
77.	Ability to recognize symbols associated with chemicals and their usage.	**10**	**Written**	**AC7108; ISO 14001; OHSAS 18001**

7. DOCUMENT REVISION HISTORY

REVISION DATE	SUMMARY
3 December 2019	Editorial revision to update program name from eQualified to PRI Qualification[SM].

ADDENDUM 1

LIST OF INTERNATIONAL STANDARDS & REFERENCE DOCUMENTS FOR CONVERSION COATING

SPECIAL PROCESS	DOCUMENT TITLE	DOCUMENT NUMBER
Quality	Audit Criteria for Aerospace Management System	AC7004
Chemical Process	Audit Criteria for Chemical Processing	AC7108
Chemical Process	Audit Criteria for Conversion Coating	AC7108/11
Chemical Process	Chemical Film Treatment for Aluminum Alloys General Purpose Coating	AMS2473
Chemical Process	Protective Treatments, Magnesium Alloys	AMS2475
Chemical Process	Conversion Coating for Aluminum Alloys Low Electrical Resistance Coating	AMS2477
Chemical Process	Phosphate Treatment Paint Base	AMS2480
Chemical Process	Phosphate Treatment Antichafing	AMS2481
Chemical Process	Coating, Black Oxide	AMS2485
Chemical Process	Conversion Coating of Titanium Alloys Fluoride-Phosphate Type	AMS2486
Quality	Quality Management System-Requirements for Aviation, Space and Defense Organization	AS9100
Chemical Process	Operating Salt Spray (Fog) Testing Apparatus	ASTM B117
Chemical Process	Measuring Adhesion by Tape Test	ASTM D3359
Safety	Occupational Health and Safety Management	BS OHSAS 18001
Environment	Environment Management System	ISO14001
Chemical Process	Chemical Conversion Coatings on Aluminum and Aluminum Alloys	MIL-DTL-5541
Chemical Process	Phosphate Coating, Heavy, Manganese or Zinc Base	MIL-DTL-16232
Chemical Process	Coating, Oxide, Black, for Ferrous Metals	MIL-DTL-13924
Chemical Process	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys	MIL-DTL-81706

ADDENDUM 2

ADDITIONAL SAFETY & ENVIRONMENTAL REQUIREMENTS

REACh REGULATION INFORMATION

Several metal finishing processes (painting, anodize, chromate conversion, passivate, electroplating) may have REACh regulated substances that are either used as process chemicals or are contained within the finished product after a process is completed. Chemical suppliers are obliged to provide a legislatively compliant safety data sheet. Below are topics of concern that a chemical processing owner should be aware of and have adequate understanding if products are produced within or shipped to the European Union.

- REACh (Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals)
- Affects raw materials/substances that go into products either produced within or shipped to the European Union.
- Under EU REACh regulation, substances that are one of the following can be regarded as substance of very high concern (SVHC):
  - carcinogenic, mutagenic or toxic to reproduction (CMRs);
  - persistent, bio-accumulative and toxic (PBTs);
  - very persistent and bio-accumulative (vPvBs);
  - seriously and / or irreversibly damaging the environment or human health, as substances damaging the hormone system;
- The SVHC candidate list is a moving target that will continue to grow with 168 substances as of January 2016. This list is reviewed nominally twice a year by ECHA.
- Some typically used SVHC's contained in or used but not limited to during chemical processing are;
  - Cadmium
  - Strontium Chromate
  - Chromium trioxide
  - Sodium dichromate
- SVHC content is allowable up to 0.1% of an article produced within or shipped to the EU.
- Additionally, SVHC's may at some time be added to the Authorization List known as Annex 14 or XIV which contains a sunset date for each SVHC in this list.
- Owner needs to be aware of sunset dates for SVHC's contained in the Authorization list. Once an SVHC from the Authorization List reaches the sunset date, it can no longer be used in the EU without specific authorization from ECHA (European Chemicals Agency).
- Manufacturing sites either located within or if shipping product to the EU must comply with all aspects of REACh. Chemical suppliers in the EU must provide safety data sheets that reflect any conditions of an authorization.
- Further information/current SVHC and Authorization list with sunset dates can be obtained by accessing (http://www.echa.europa.eu/web/guest/candidate-list-table)