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Program Document CPBOK

PD 6103

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BODY OF KNOWLEDGE:

ROLE DESCRIPTION: OPERATOR

SPECIAL PROCESS: Chemical Processing

SCOPE: Plating

METHOD: Corrosion Protection/Engineering Plating (Chromium, Nickel, Rhodium, Tin); Sacrificial Plating (Cadmium, Zinc); Plating for Electronics (Copper, Tin-Lead); Precious Metals Plating (Gold, Palladium, Platinum, Silver)

LEVEL: Operator

All eQualified examinations are created using the applicable eQualified 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 eQualified BoKs are created by subject matter experts through an exhaustive job analysis process as detailed in the eQualified Program Document 6100: Industry Managed Special Process Bodies of Knowledge. All eQualified BoKs are updated periodically according to the requirements of the current eQualified PD6100 document to ensure they are consistent with current industry practice.

1. INTRODUCTION

This document has been created by the eQualified Chemical Process Body of Knowledge Review Board (CPBoKRB) according to the requirements of eQualified Program Document PD6100 Industry Managed Special Process Bodies of Knowledge.

This document constitutes the eQualified BoK for Chemical Processing Corrosion Protection/Engineering Plating (Chromium, Nickel, Rhodium, Tin); Sacrificial Plating (Cadmium, Zinc); Plating for Electronics (Copper, Tin-Lead); Precious Metals Plating (Gold, Palladium, Platinum, Silver); for the Operator 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 version 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 eQualified examination candidate preparation
- Chemical Process Examination Review Board (CP-ERB) for the development of eQualified examinations
- Candidates taking eQualified examinations who wish to prepare in advance

2. REFERENCES

eQualified documents:

PD6000 Governance & Administration of eQualified 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 eQualified 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, Planner and Owner. Please refer to the current version of PD 6000 for definitions

METHOD: A well-defined division of a SPECIAL PROCESS widely recognised 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 eQualified examination candidates are recommended to read all documents referenced in section 2 of this document.

As stated in eQualified PD6200, every eQualified exam question shall relate directly to and be derived from the information as detailed in the current version of the BoK.

Re-assessment 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 eQualified approved providers can be found at www.eQualified.com)

5. LEVELS

	Level		
Descriptors	Operator (OP) <i>Understand and perform the hands-on operations of the special process for which qualification is sought.</i>	Planner (PL) <i>Capable of selecting manufacturing processes and interpreting process procedures to conform to customer specification and requirements.</i> <i>Capable of problem solving and resolving day to day issues.</i>	Owner (OW) <i>Capable of writing, reviewing and approving processes, procedures and qualifications of Operators and Planners. Capable of designing new processes and resolving issues among other levels.</i>
Special Process Specific Criteria	No additional criteria for the Plating process.	No additional criteria for the Plating process.	No additional criteria for the Plating process.
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 ones 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 Plating processes...
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.		

Special Process Bodies of Knowledge Review Boards must complete Table 1 to form the BoK

TABLE 1

ROLE DESCRIPTION: Operator

SPECIAL PROCESS: Chemical Processing

SCOPE / METHOD: Electroplating & Electroless Plating / Cadmium, Chromium, Copper, Electroless Nickel, Gold, Nickel, Palladium, Rhodium, Silver, Sulfamate Nickel, Tin, Tin-Lead, and Zinc. **REFERENCE GUIDELINES:**

Addendum 1 is a list of the International Standards applicable to Plating processes.

Row #	COMPETENCE	Level (e.g. OP, PL, OW, T1)	Weight (1,3,7,10)	Exam Type Gen/Specific /Practical	Checklist Reference	Reference Guidelines
1.	KNOWLEDGE: The basic knowledge of the special processes, methods and tools					
2.	GENERAL KNOWLEDGE:					
3.	Understand how to determine if there has been damage to the part surface.	OP	10	GEN	AC 7108: 4.4	General Industry
4.	Full and complete understanding of Internal Work instructions	OP	7	GEN	AC 7108: 3.3.2	General Industry
5.	Know how to access customer specifications and requirements (i.e. where to find them).	OP	7	GEN	AC 7108: 3.2	General Industry
6.	Understand customer specification requirements in the context of performing the Plating process.	OP	3	GEN		General Industry
7.	Understand Industry Standards (see Addendum 1 of this document)	OP	7	GEN		Addendum 1
8.	Knowledge of the Surface Preparation procedures	OP	10	GEN		General Industry
9.	Basic understanding of the control and calibration requirements for equipment.	OP	7	GEN		General Industry
10.	Know how to perform the Water Break Free Cleanliness Verification	OP	10	GEN	AC 7108: 5.8.3	General Industry
11.	Knowledge and understanding of mathematics, including decimal and fractions	OP	3	GEN		General Industry
12.	Know how to use precision measuring instruments and equipment	OP	7	GEN		General Industry
13.	Know and understand Job Documentation including Fixed and Frozen Process requirements.	OP	10	GEN		General Industry
14.	Know and understand General Cleaning, Mechanical Cleaning, Chemical Cleaning, and Activation methods prior to Plating.	OP	10	GEN	AC 7108: 3.8, 5.6 – 5.8	General Industry
15.	Know and understand how to correct or adjust the ASF/plating current for the Plating process..	OP	3	GEN		General Industry
16.	Know and understand the impact of material hardness pre and post plating	OP	7	GEN		General Industry
17.	Know when and why pre-plate stress relief is required	OP	7	GEN		General Industry
18.	Know and understand Post Plate Hydrogen embrittlement relief requirements	OP	7	GEN		General Industry
19.	Understand the need for pre-process checks (such as calibration status and solution temperatures and understand proper verification methods.	OP	10	GEN	AC 7108: 3.10	General Industry
20.	Understand the mechanics and importance of Racking, Part Set-Up, and Masking.	OP	10	GEN	AC 7108: 5.9	
21.	Know how to recognize unsafe and/or inappropriate work practices.	OP	7	GEN		General Industry
22.	Know and understand the effects and aspects of the Plating process on different alloys and materials (including chemicals, masking materials, tanks, work environment, etc.)	OP	3	GEN		General Industry
23.	Understand how to deal with incorrect or inappropriate Plating.	OP	3	GEN		General Industry
24.	General knowledge and understand of all the Plating processes and methods.	OP	7	GEN		General Industry
25.	CORROSION PROTECTION/ENGINEERING PLATING					

	(CHROMIUM, NICKEL, RHODIUM, TIN)					
26.	Be aware of substrate requirements for this type of plating.	OP	3	GEN		General Industry
27.	Know cleaning and activation steps and restrictions for this type of plating.	OP	7	GEN		General Industry
28.	Understand "Accept & Reject" Criteria and testing for this type of plating.	OP	7	GEN		General Industry
29.	Understand how to identify which features require plating, masking, etc. as required by governing engineering documents.	OP	3	GEN		General Industry
30.	Understand the environmental, worker safety and health concerns associated with this type of plating.	OP	3	GEN		General Industry
31.	SACRIFICIAL PLATING (CADMIUM, ZINC)					
32.	Be aware of substrate requirements for this type of plating in particular, pits, scratches, surface roughness, etc.	OP	3	GEN		General Industry
33.	Know cleaning and activation steps and restrictions for this type of plating.	OP	7	GEN		General Industry
34.	Understand "Accept & Reject" Criteria and testing for this type of plating.	OP	7	GEN		General Industry
35.	Understand how to identify which features require plating, masking, etc. as required by governing engineering documents.	OP	3	GEN		General Industry
36.	Understand the environmental, worker safety and health concerns associated with this type of plating.	OP	3	GEN		General Industry
37.	PLATING FOR ELECTRONICS (COPPER, TIN-LEAD)					
38.	Be aware of substrate requirements for this type of plating.	OP	3	GEN		General Industry
39.	Know cleaning and activation steps and restrictions for this type of plating.	OP	7	GEN		General Industry
40.	Understand "Accept & Reject" Criteria and testing for this type of plating.	OP	7	GEN		General Industry
41.	Understand how to identify which features require plating, masking, etc. as required by governing engineering documents.	OP	3	GEN		General Industry
42.	Understand the environmental, worker safety and health concerns associated with this type of plating.	OP	3	GEN		General Industry
43.	PRECIOUS METALS PLATING (GOLD, PALLADIUM, PLATINUM, SILVER)					
44.	Be aware of substrate requirements for this type of plating.	OP	3	GEN		General Industry
45.	Know cleaning and activation steps and restrictions for this type of plating.	OP	7	GEN		General Industry
46.	Understand "Accept & Reject" Criteria and testing for this type of plating.	OP	7	GEN		General Industry
47.	Understand how to identify which features require plating, masking, etc. as required by governing engineering documents.	OP	3	GEN		General Industry
48.	Understand the environmental, worker safety and health concerns associated with this type of plating.	OP	3	GEN		General Industry
49.	SKILLS: Defined within these rolls describes the range of skills. The skills required to perform a particular special process task					
50.	READ AND UNDERSTAND WRITTEN INSTRUCTIONS:					
51.	Ability to understand specification requirements and customer flow-down requirements.	OP	10	GEN		General Industry
52.	Apply plating techniques appropriately.	OP	10	GEN		General Industry
53.	Verify and validate the plating results.	OP	3	GEN		General Industry
54.	Properly report nonconformance.	OP	10	GEN		General Industry
55.	Apply technical knowledge in a skillful way when solving problems.	OP	10	GEN		General Industry
56.	Be familiar with the scope and limitations of plating.	OP	10	GEN		General Industry
57.	Use of appropriate equipment for the plating process.	OP	3	GEN		General Industry
58.	Ability to follow instructions.	OP	10	GEN		General Industry
59.	Interpretation of an acceptable plating process.	OP	10	GEN		General Industry
60.	Must be able to read drawings and specifications.	OP	10	GEN		General

61.	Must be able to interpret specification requirements.	OP	10	GEN		Industry General Industry
62.	Must be able to set-up operations (equipment, rates, timers & temperatures) including alternate procedures as appropriate.	OP	10	GEN		General Industry
63.	Must be able to understand and interpret shop travelers.	OP	10	GEN		General Industry
64.	PERSONAL ATTRIBUTES: Are statements that will enable judgment of the person's personal attributes					
65.	Be able to work independently with a minimum of supervision.	OP	3	GEN		General Industry
66.	Must have a high degree of integrity	OP	10	GEN		General Industry
67.	Be attentive to details	OP	10	GEN		General Industry
68.	Be flexible	OP	3	GEN		General Industry
69.	Tolerate stress	OP	7	GEN		General Industry
70.	Exhibit conflict resolution	OP	3	GEN		General Industry
71.	Decision making ability	OP	3	GEN		General Industry
72.	Team Worker	OP	10	GEN		General Industry
73.	Ethical Behavior	OP	10	GEN		General Industry
74.	Exhibit Leadership	n/a				
75.	EXPERIENCE: Are the minimum experience requirement expected to demonstrate their competence.					
76.	EDUCATION:					
77.	High School Diploma or GED or Secondary Education	OP	10	GEN		General Industry
78.	Apprenticeship	OP	7	GEN		General Industry
79.	Industry Training or Courses	OP	3	GEN		General Industry
80.	TRAINING / HANDS-ON-EXPERIENCE:					
81.	Complete on the job training: Minimum number of hours-					
82.	OPERATOR – 160 Hours	OP	10	GEN		General Industry
83.	PLANNER – 160 Hours	N/A				
84.	OWNER – 640 Hours	N/A				
85.	NON-SPECIAL PROCESS RELATED REQUIREMENTS: Defined within these rolls are other general or pre-requisite needed					
86.	Capability to lift up to 50 lbs. (23 kg)	OP	7	GEN		General Industry
87.	Able to deal with repetitive bending and stooping	OP	10	GEN		General Industry
88.	General understand of Quality Systems AS/EN/JISQ 9100 , or AC 7004, or equivalent	OP	3	AS	AC7004	AS/EN/JISQ 9100
89.	SAFETY & ENVIRONMENTAL REQUIREMENTS:					
90.	Knowledge and understanding of safety and handling of hazardous material, chemicals, etc. including safe storage, interpretation of Health & Safety Data Sheets and Regulatory Requirements.	OP	7	GEN		General Industry
91.	Understand Safety Data Sheets (SDS) and Personal Protective Equipment Requirements: When and how to use appropriate personal protective equipment (goggles, gloves, rubber boots, aprons, etc.)	OP	7	GEN		General Industry
92.	Understand which personal protective equipment to use, when and why.	OP	10	GEN		General Industry

93.	Understand the safe storage, shelf life and mixing of chemicals.	OP	10	GEN		General Industry
94.	Ability to recognize symbols associated with chemicals and their usage.	OP	10	GEN		General Industry
95.	PORTFOLIO REQUIREMENTS (for OWNER LEVEL Qualification Only) Portfolio must include the following components for consideration					
96.	Owner Exam Score (<i>Must receive at least 80%</i>)					
97.	Owner Exam Validity (<i>Must be within 6 months of requalification</i>)					
98.	Owner Experience Survey					
99.	Owner Resume of Experience (<i>Description of Current and Previous Jobs</i>)					
100.	Owner Employer / Client Verification (<i>Signed Statement of Corroboration by either current employer or client</i>)					
101.	NOTE: The above components will be scored accordingly					

ADDENDUM 1

LIST OF INTERNATIONAL STANDARDS FOR PLATING PROCESSES

SPECIAL PROCESS	DOCUMENT TITLE	DOCUMENT NUMBER
Brush Plating	Military Standard: Selective (Brush Plating) Electro-Deposition	MIL-STD-865
Cadmium Plating	Plating Cadmium (Electrodeposited)	SAE AMS-QQ-P-416
Chromium Plating	Chromium Plating (Electrodeposited)	SAE AMS-QQ-C-320
Copper Plating	Military Specification: Copper Plating (Electrodeposited)	MIL-C-14550
Electroless Nickel Plating	Military Specification: Coatings – Electroless Nickel	SAE-AMS-C-26074
Gold Plating	Military Specification Gold Plating Electrodeposited	MIL-G-45204
Nickel Plating	Federal Specification: Nickel Plating (Electrodeposited)	SAE-AMS-QQ-N-290
Palladium Plating	Military Specification: Palladium Plating (Electrodeposited)	MIL-P-45209
Rhodium Plating	Military Specification: Rhodium Plating (Electrodeposited)	MIL-R-46085
Silver Plating	Federal Specification: Silver Plating, Electrodeposited	SAE-AMS-QQ-S-365
Sulfamate Nickel	Military Specification: Plating, Soft-Nickel Electrodeposited Sulfamate Bath	MIL-P-27418
Tin Plating	Military Specification: Electrodeposited or Hot Dipped, For Ferrous & Non-Ferrous Metals	MIL-T-10727
Tin-Lead Plating	Military Specification: Electrodeposited or Hot Dipped, For Ferrous & Non-Ferrous Metals	MIL-P-81728
Zinc Plating	Federal Specification: Zinc Coating, Electrodeposited	SAE-AMS-QQ-Z-325
Zinc-Nickel Plating		AMS2417