



Program Document CPBOK

161 Thorn Hill Road
Warrendale, PA 15086-7527

PD 6103

CPBok-011/PL-2 REV. N/A

Issued: 07-Aug-15

Revised: N/A

Superseding: N/A

BODY OF KNOWLEDGE:

ROLE DESCRIPTION: PLANNER

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: Planner

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 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) (Chemical Process, for the 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 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 the Plating 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.		

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

TABLE 1

ROLE DESCRIPTION: Planner

SPECIAL PROCESS: Chemical Processing

SCOPE / 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)

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	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.	PL	10	GEN	AC 7108: 4.4
4.	Full and complete understanding of Internal Work instructions	PL	10	GEN	AC 7108: 3.3.2
5.	Know how to access customer specifications and requirements (i.e. where to find them).	PL	10	GEN	AC 7108: 3.2
6.	Understand how to interpret customer specification and requirements in the context of performing the Plating process.	PL	7	GEN	General Industry
7.	Understand Industry Standards (see Addendum 1 of this document)	PL	7	GEN	Addendum 1
8.	Knowledge and understanding of the Accept/Reject Criteria	PL	7	GEN	AC 7108: 4.4
9.	Knowledge of the Surface Preparation procedures	PL	10	GEN	General Industry
10.	Basic understanding of the control and calibration requirements for equipment.	PL	7	GEN	General Industry
11.	Know how to perform the Water Break Free Cleanliness Verification	PL	7	GEN	AC 7108: 5.8.3
12.	Knowledge and understanding of mathematics, including decimal and fractions	PL	10	GEN	General Industry
13.	Know how to use precision measuring instruments and equipment	PL	7	GEN	General Industry
14.	Know and understand Job Documentation including Fixed and Frozen Process requirements.	PL	10	GEN	General Industry
15.	Know and understand proper chemistry, both usage and application.	PL	10	GEN	General Industry
16.	Know and understand General Cleaning, Mechanical Cleaning and Chemical Cleaning prior to Plating.	PL	10	GEN	AC 7108: 3.8, 5.6 – 5.8
17.	Know and understand how to correct or adjust the ASF for the Plating process.	PL	7	GEN	General Industry
18.	Know and understand Laboratory Procedures.	PL	7	GEN	General Industry
19.	Know and understand analytical requirements and limits.	PL	7	GEN	General Industry
20.	Know and understand how to review and take action on analytical data & limits.	PL	7	GEN	General Industry
21.	Understand the need for pre-process checks (such as calibration status and solution temperatures.	PL	7	GEN	AC 7108: 3.10
22.	Understand the mechanics and importance of Racking, Part Set-Up and Masking.	PL	7	GEN	AC 7108: 5.9
23.	Thoroughly understand the Plating process.	PL	10	GEN	General Industry
24.	Knowledge and ability to write and review internal procedures and practices.	PL	10	GEN	General Industry
25.	Know how to recognize unsafe and/or inappropriate work practices.	PL	7	GEN	General Industry
26.	Know and understand the effects and aspects of the Plating process on different alloys and materials (including chemicals, masking materials, tanks, work environment, etc.)	PL	10	GEN	General Industry
27.	Understand how to deal with incorrect or inappropriate Plating.	PL	10	GEN	General Industry
28.	Knowledge and understanding about the selection of appropriate equipment for use in the Plating process.	PL	7	GEN	General Industry
29.	Understanding of the significance of pH and grades of water purity and their measurement.	PL	7	GEN	General Industry
30.	General knowledge and understand of all the Plating processes and methods.	PL	10	GEN	General Industry
31.	CORROSION PROTECTION/ENGINEERING PLATING (CHROMIUM, NICKEL, RHODIUM, TIN)				
32.	Be aware of substrate requirements for this type of plating.	PL	7	GEN	General Industry
33.	Know cleaning steps and restrictions for this type of plating.	PL	7	GEN	General Industry
34.	Understand "Accept & Reject" Criteria and testing for this type of plating.	PL	7	GEN	General Industry
35.	Know uses, features and applications for this type of plating.	PL	10	GEN	General Industry
36.	Understand the limitations for this type of plating.	PL	10	GEN	General Industry
37.	Understand the environmental, worker safety and health concerns associated with	PL	7	GEN	General Industry

	this type of plating.				
38.	SACRIFICIAL PLATING (CADMIUM, ZINC)				
39.	Be aware of substrate requirements for this type of plating.	PL	7	GEN	General Industry
40.	Know cleaning steps and restrictions for this type of plating.	PL	7	GEN	General Industry
41.	Understand "Accept & Reject" Criteria and testing for this type of plating.	PL	7	GEN	General Industry
42.	Know uses, features and applications for this type of plating.	PL	10	GEN	General Industry
43.	Understand the limitations for this type of plating.	PL	10	GEN	General Industry
44.	Understand the environmental, worker safety and health concerns associated with this type of plating.	PL	7	GEN	General Industry
45.	PLATING FOR ELECTRONICS (COPPER, TIN-LEAD)				
46.	Be aware of substrate requirements for this type of plating.	PL	7	GEN	General Industry
47.	Know cleaning steps and restrictions for this type of plating.	PL	7	GEN	General Industry
48.	Understand "Accept & Reject" Criteria and testing for this type of plating.	PL	7	GEN	General Industry
49.	Know uses, features and applications for this type of plating.	PL	10	GEN	General Industry
50.	Understand the limitations for this type of plating.	PL	10	GEN	General Industry
51.	Understand the environmental, worker safety and health concerns associated with this type of plating.	PL	7	GEN	General Industry
52.	PRECIOUS METALS PLATING (GOLD, PALLADIUM, PLATINUM, SILVER)				
53.	Be aware of substrate requirements for this type of plating.	PL	7	GEN	General Industry
54.	Know cleaning steps and restrictions for this type of plating.	PL	7	GEN	General Industry
55.	Understand "Accept & Reject" Criteria and testing for this type of plating.	PL	7	GEN	General Industry
56.	Know uses, features and applications for this type of plating.	PL	10	GEN	General Industry
57.	Understand the limitations for this type of plating.	PL	10	GEN	General Industry
58.	Understand the environmental, worker safety and health concerns associated with this type of plating.	PL	7	GEN	General Industry
59.	SKILLS: Defined within these rolls describes the range of skills. The skills required to perform a particular special process task				
60.	READ AND UNDERSTAND WRITTEN INSTRUCTIONS:	PL	10	GEN	General Industry
61.	Ability to understand specification requirements and customer flow-down requirements	PL	10	GEN	General Industry
62.	Apply plating techniques appropriately	PL	3	GEN	General Industry
63.	Verify and validate the plating results.	PL	3	GEN	General Industry
64.	Properly report nonconformances	PL	10	GEN	General Industry
65.	Apply technical knowledge in a skillful way when solving problems	PL	10	GEN	General Industry
66.	Be familiar with the scope and limitations of plating.	PL	10	GEN	General Industry
67.	Use of appropriate equipment for the plating process.	PL	7	GEN	General Industry
68.	Ability to follow instructions	PL	10	GEN	General Industry
69.	Ability to write Work Instructions and Procedures	PL	10	GEN	General Industry
70.	Interpretation of an acceptable plating process	PL	10	GEN	General Industry
71.	Must be able to read drawings and specifications	PL	10	GEN	General Industry
72.	Must be able to interpret specification requirements	PL	10	GEN	General Industry
73.	Must be able to understand and interpret shop travelers	PL	7	GEN	General Industry
74.	PERSONAL ATTRIBUTES: Are statements that will enable judgment of the person's personal attributes				
75.	Be able to work independently with a minimum of supervision	PL	10	GEN	General Industry
76.	Must have a high degree of integrity	PL	10	GEN	General Industry
77.	Be attentive to details	PL	10	GEN	General Industry
78.	Be flexible	PL	7	GEN	General Industry
79.	Tolerate stress	PL	7	GEN	General Industry
80.	Exhibit conflict resolution	PL	7	GEN	General Industry
81.	Decision making ability	PL	10	GEN	General Industry
82.	Team Worker	PL	10	GEN	General Industry

83.	Ethical Behavior	PL	10	GEN	General Industry
84.	Exhibit Leadership	PL	7	GEN	General Industry
85.	EXPERIENCE: Are the minimum experience requirement expected to demonstrate their competence.				
86.	EDUCATION:				
87.	High School Diploma or GED or Secondary Education	PL	10	GEN	General Industry
88.	Apprenticeship	N/A	3	GEN	General Industry
89.	Industry Training or Courses	PL	3	GEN	General Industry
90.	TRAINING / HANDS-ON-EXPERIENCE:	PL	10	GEN	General Industry
91.	Complete on the job training: Minimum number of hours-				
92.	OPERATOR – 160 Hours	N/A			
93.	PLANNER – 160 Hours	PL	10	GEN	General Industry
94.	OWNER – 640 Hours	N/A			
95.	NON-SPECIAL PROCESS RELATED REQUIREMENTS: Defined within these rolls are other general or pre-requisite needed				
96.	General understand of Quality Systems AS/EN/JISQ 9100 , or AC7004, or equivalent	OP PL OW	3 7 10	GEN	AS 9100 AC7004
97.	SAFETY & ENVIRONMENTAL REQUIREMENTS:				
98.	Knowledge and understanding of safety and handling of hazardous material, chemicals, etc. including safe storage, interpretation of Health & Safety Data Sheets and Regulatory Requirements	PL	10	GEN	General Industry
99.	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.)	PL	10	GEN	General Industry
100.	Understand which personal protective equipment to use, when and why	PL	10	GEN	General Industry
101.	Understand the safe storage, shelf life and mixing of chemicals	PL	10	GEN	General Industry
102.	Ability to recognize symbols associated with chemicals and their usage	PL	10	GEN	General Industry
103.	PORTFOLIO REQUIREMENTS (for OWNER LEVEL Qualification Only) Portfolio must include the following components for consideration				
104.	Owner Exam Score (Must receive at least 80%)	N/A			
105.	Owner Exam Validity (Must be within 6 months of requalification)	N/A			
106.	Owner Experience Survey	N/A			
107.	Owner Resume of Experience (Description of Current and Previous Jobs)	N/A			
108.	Owner Employer / Client Verification (Signed Statement of Corroboration by either current employer or client)	N/A			
109.					
110.	NOTE: The above components will be scored accordingly				

ADDENDUM 1

LIST OF INTERNATIONAL STANDARDS FOR PLATING PROCESSES

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