161Thorn Hill Road Warrendale, PA 15086-7527	**Program Document CPBOK**	**PD 6103** **CPBok-007/OW-3- REV. N/A** Issued: 2-2015 Revised: N/A Superseding: N/A

BODY OF KNOWLEDGE:

ROLE DESCRIPTION: ANODIZE OWNER
SPECIAL PROCESS: Chemical Processing
SCOPE: Anodize
METHOD: Chromic Anodizing, Sulphuric Anodizing, Hardcoat/Hard Anodizing, Anodizing for Bonding, Anodizing for Titanium, Magnesium, Boric Acid Anodizing, Tartaric Sulphuric Anodizing
LEVEL: Owner

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 Processing Body of Knowledge Review Board (CPBoKRB) according to the requirements of eQuaLified Program Document PD6100 Industry Managed Special Process Bodies of Knowledge.

This document consitutes the eQuaLified BoK for Chemical Processing, Anodize including Chromic Acid Anodizing, Sulphuric Acid Anodizing, Hardcoat/Hard Anodizing Anodizing for Bonding, Anodizing for Titanium, Magnesium, Boric Acid Anodizing, Tartaric Sulphuric Anodizing 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 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 Processing Examination Review Board (CP-ERB) for the development of eQuaLified examinations
- Candidates taking eQuaLified examinations who wish to prepare in advance

2. REFERENCES

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eQuaLified documents:

PD6000	Governance & Administration of eQuaLified Program
PD6100	Industry Managed Special Process Bodies of Knowledge
PD6200	Industry Managed Special Process Examinations System
IAQG	International Aerospace Quality Group

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. Skill is 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)** *Understand and perform the hands-on operations of the special process for which qualification is sought.*	**Planner (PL)** *Capable of selecting manufacturing processes and interpreting process procedures to conform to customer specification and requirements.* *Capable of problem solving and resolving day to day issues.*	**Owner (OW)** *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.*
Anodize Process Specific Criteria	No additional criteria for the Anodize process.	No additional criteria for the Anodize process	No additional criteria for the Anodize process
Technical Knowledge	Basic knowledge of the Anodize process, its main processes, methods and tools.	Good level of knowledge in all aspects of the Anodize 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 Anodize 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 Anodize 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: Anodize Owner
SPECIAL PROCESS: Chemical Processing
SCOPE / METHOD: Chromic Acid Anodizing, Sulphuric Acid Anodizing, Hardcoat/Hard Anodizing, Anodizing for Bonding, Titanium Anodizing, Magnesium, Boric Acid Anodizing, Tartaric Sulphuric Anodizing
REFERENCE GUIDELINES: Addendum 1 is a list of the International Standards applicable to Anodize 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.	OW	10	GEN	AC 7108: 4.4	
4.	Full and complete understanding of Internal Work instructions	OW	10	GEN	AC 7108: 3.3.2	
5.	Know how to access customer specifications and requirements (i.e. where to find them).	OW	10	GEN	AC 7108: 3.2	
6.	Understand how to interpret customer specification and requirements in the context of performing the Anodize process.	OW	10	GEN		General Industry
7.	Understand Industry Standards (see Addendum 1 of this document)	OW	10	GEN		Addendum 1
8.	Knowledge and understanding of the Accept/Reject Criteria	OW	10	GEN	AC 7108: 4.4	
9.	Knowledge of the Surface Preparation procedures	OW	10	GEN		General Industry
10.	Basic understanding of the control and calibration requirements for equipment.	OW	10	GEN		General Industry
11.	Know how to perform the Water Break Free Cleanliness Verification	OW	10	GEN	AC 7108: 5.8.3	
12.	Knowledge and understanding of mathematics, including decimal and fractions	OW	10	GEN		General Industry
13.	Know how to use precision measuring instruments and equipment	OW	10	GEN		General Industry
14.	Know and understand Job Documentation including Fixed and Frozen Process requirements.	OW	10	GEN		General Industry
15.	Know and understand proper chemistry, both usage and application.	OW	10	GEN		General Industry
16.	Know and understand General Cleaning, Mechanical Cleaning and Chemical Cleaning prior to Anodize.	OW	10	GEN	AC 7108: 3.8, 5.6 – 5.8	MIL-A-8625F:
17.	Know and understand Sealing performance and process requirements.	OW	10	GEN	AC 7108:3.8	
18.	Know and understand how to properly calculate the Ramp Rate and ASF for the Anodize process.	OW	10	GEN		General Industry
19.	Know and understand how to properly calculate Surface Area, especially of complex geometric parts/shapes	OW	10	GEN		General Industry
20.	Know and understand Laboratory Procedures.	OW	7	GEN		General Industry
21.	Know and understand Analytical requirements and limits.	OW	10	GEN		General Industry
22.	Know and understand how to review and take action on Analytical data & limits.	OW	7	GEN		General Industry
23.	Understand the need for pre-process checks (such as calibration status and solution temperatures.	OW	10	GEN	AC 7108: 3.10	
24.	Understand the mechanics and importance of Racking, Part Set-Up and Masking.	OW	10	GEN	AC 7108: 5.9	
25.	Knowledge and ability to write and review internal procedures and practices.	OW	7	GEN		General Industry
26.	Know how to recognize unsafe and/or inappropriate work practices.	OW	10	GEN		General Industry

27.	Know and understand the effects and aspects of the Anodize process on different alloys and materials (including chemicals, masking materials, tanks, work environment, etc.)	OW	10	GEN		General Industry
28.	Understand how to deal with incorrect or inappropriate Anodizing.	OW	10	GEN		General Industry
29.	Knowledge and understand about the selection of appropriate equipment for use in the Anodize process.	OW	10	GEN		General Industry
30.	Understanding of the significance of pH and grades of water purity and their measurement.	OW	7	GEN		General Industry
31.	General knowledge and understand of all the Anodize processes.	OW	10	GEN		General Industry
32.	CHROMIC ACID ANODIZING					
33.	Understand "Accept & Reject" Criteria including thickness and color range.	OW	10	GEN		General Industry
34.	Know uses, features and applications for this type of Anodize.	OW	10	GEN		General Industry
35.	Understand the limitations for this type of Anodize.	OW	10	GEN		General Industry
36.	Understand the dying and sealing options and requirements.	OW	10	GEN		General Industry
37.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	GEN		General Industry
38.	SULFURIC ACID ANODIZE					
39.	Understand "Accept & Reject" Criteria including thickness and color range.	OW	10	GEN		General Industry
40.	Know uses, features and applications for this type of Anodize.	OW	10	GEN		General Industry
41.	Understand the limitations for this type of Anodize.	OW	10	GEN		General Industry
42.	Understand the dying and sealing options and requirements.	OW	10	GEN		General Industry
43.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	GEN		General Industry
44.	Understand the comparison of Sulfuric Acid Anodize related to other types of Anodize in regards to cost of chemicals used, heating, power consumption and length of time to obtain required thickness.	OW	10	GEN		General Industry
45.	Knowledge of "Thin-film Sulfuric Acid Anodize" and similar options.	OW	10	GEN		General Industry
46.	HARDCOAT OR HARD ANODIZING					
47.	Understand "Accept & Reject" Criteria including thickness.	OW	10	GEN		General Industry
48.	Know uses, features and applications for this type of Anodize.	OW	10	GEN		General Industry
49.	Understand the limitations for this type of Anodize.	OW	10	GEN		General Industry
50.	Understand the dying and sealing options and requirements.	OW	10	GEN		General Industry
51.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	GEN		General Industry
52.	PHOSPHORIC ACID ANODIZE					
53.	Understand "Accept & Reject" Criteria.	OW	10	GEN		General Industry
54.	Know uses, features and applications for this type of Anodize.	OW	10	GEN		General Industry
55.	Understand the limitations for this type of Anodize.	OW	10	GEN		General Industry
56.	Understand the dying and sealing options and requirements.	OW	10	GEN		General Industry
57.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	GEN		General Industry
58.	Knowledge and understanding of post anodize – pre-bond handling and storage requirements.	OW	10	GEN		General Industry
59.	ANODIZING FOR BONDING					
60.	Understand "Accept & Reject" Criteria.	OW	10	SPE		General Industry
61.	Know uses, features and applications for this type of Anodize.	OW	10	SPE		General Industry
62.	Understand the limitations for this type of Anodize.	OW	10	SPE		General

						Industry
63.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	SPE		General Industry
64.	What type of base materials are used for this type of Anodizing?	OW	10	SPE		General Industry
65.	Type of surface preparations used for Anodize bonding.	OW	10	SPE		General Industry
66.	Knowledge and understanding of post anodize – pre-bond handling and storage requirements.	OW	10	SPE		General Industry
67.	TITANIUM ANODIZING					
68.	Understand "Accept & Reject" Criteria.	OW	10	SPE		General Industry
69.	Know uses, features and applications for this type of Anodize.	OW	10	SPE		General Industry
70.	Understand the limitations for this type of Anodize.	OW	10	SPE		General Industry
71.	Understand the differences between achieving color on Titanium and other metals, such as aluminum.	OW	10	SPE		General Industry
72.	Know cleaning restrictions when using Titanium.	OW	10	SPE		General Industry
73.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	SPE		General Industry
74.	MAGNESIUM ANODIZING					
75.	Understand "Accept & Reject" Criteria.	OW	10	SPE		General Industry
76.	Know uses, features and applications for this type of Anodize.	OW	10	SPE		General Industry
77.	Understand the limitations for this type of Anodize.	OW	10	SPE		General Industry
78.	Understand the dying and sealing options and requirements.	OW	10	SPE		General Industry
79.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	SPE		General Industry
80.	BORIC SULFURIC ACID ANODIZING (BSAA)					
81.	Understand "Accept & Reject" Criteria.	OW	10	GEN		General Industry
82.	Know uses, features and applications for this type of Anodize.	OW	10	GEN		General Industry
83.	Understand the limitations for this type of Anodize.	OW	10	GEN		General Industry
84.	Understand the dying and sealing options and requirements.	OW	10	GEN		General Industry
85.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	GEN		General Industry
86.	TARTARIC SULPHURIC ANODIZING					
87.	Understand "Accept & Reject" Criteria.	OW	10	SPE		General Industry
88.	Know uses, features and applications for this type of Anodize.	OW	10	SPE		General Industry
89.	Understand the limitations for this type of Anodize.	OW	10	SPE		General Industry
90.	Understand the environmental, worker safety and health concerns associated with this type of Anodize.	OW	10	SPE		General Industry
	SKILLS: Defined within these rolls describes the range of skills. The skills required to perform a particular special process task					
91.	READ AND UNDERSTAND WRITTEN INSTRUCTIONS:	OW	10	GEN		General Industry
92.	Ability to understand specification requirements and customer flow-down requirements	OW	10	GEN		General Industry
93.	Apply Anodizing techniques appropriately	OW	10	GEN		General Industry
94.	Verify and validate the Anodize results.	OW	10	GEN		General Industry
95.	Properly report nonconformances	OW	10	GEN		General Industry
96.	Apply technical knowledge in a skillful way when solving problems	OW	10	GEN		General Industry
97.	Be familiar with the scope and limitations of Anodizing.	OW	10	GEN		General

						Industry
98.	Use of appropriate equipment for the Anodize process.	OW	10	GEN		General Industry
99.	Ability to follow instructions	OW	10	GEN		General Industry
100.	Ability to write Work Instructions and Procedures	OW	10	GEN		General Industry
101.	Interpretation of an acceptable Anodize process	OW	10	GEN		General Industry
102.	Must be able to read drawings and specifications	OW	10	GEN		General Industry
103.	Must be able to interpret specification requirements	OW	10	GEN		General Industry
104.	Must be able to set-up operations (equipment, rates, timers & temperatures) including alternate procedures as appropriate	OW	10	GEN		General Industry
105.	Must be able to understand and interpret shop travelers	OW	10	GEN		General Industry
106.	Ability to identify training needs and coordinate the training	OW	10	GEN		General Industry
107.	Be able to identify strengths and weaknesses in the personnel involved in the anodizing activity	OW	10	GEN		General Industry
108.	**PERSONAL ATTRIBUTES:** Are statements that will enable judgment of the person's personal attributes					
109.	Be able to work independently with a minimum of supervision	OW	10	GEN		General Industry
110.	Must have a high degree of integrity	OW	10	GEN		General Industry
111.	Be attentive to details	OW	10	GEN		General Industry
112.	Be flexible	OW	7	GEN		General Industry
113.	Tolerate stress	OW	10	GEN		General Industry
114.	Exhibit conflict resolution	OW	10	GEN		General Industry
115.	Decision making ability	OW	10	GEN		General Industry
116.	Team Worker	OW	10	GEN		General Industry
117.	Ethical Behavior	OW	10	GEN		General Industry
118.	Exhibit Leadership	OW	10	GEN		General Industry
119.	**EXPERIENCE:** Are the minimum experience requirement expected to demonstrate their competence.					
120.	EDUCATION:					
121.	High School Diploma or GED or Secondary Education	OW	10	GEN		General Industry
122.	Apprenticeship	OW	7	GEN		General Industry
123.						
124.	Industry Training or Courses	OW	3 7	GEN		General Industry
125.	TRAINING / HANDS-ON-EXPERIENCE:	OW	10	GEN		General Industry
126.	Complete on the job training: Minimum number of hours-					
127.	OPERATOR – 160 Hours					
128.	PLANNER – 160 Hours					
129.	OWNER – 640 Hours	OW	10	GEN		General Industry
130.	**NON-SPECIAL PROCESS RELATED REQUIREMENTS:** Defined within these rolls are other general or pre-requisite needed					
131.	Capability to lift up to 50 lbs. (23 kg)	OW	3	GEN		General Industry
132.	Able to deal with repetitive bending and stooping	OW	3	GEN		General

						Industry
133.	**General understand of Quality Systems AS/EN/JISQ 9100 , or AC 7400, or equivalent**	**OW**	**7 10**	**AS**		**Aerospace Standard**
134.	**SAFETY & ENVIRONMENTAL REQUIREMENTS:**					
135.	**Knowledge and understanding of safety and handling of hazardous material, chemicals, etc. including safe storage, interpretation of Health & Safety Data Sheets and Regulatory Requirements**	**OW**	**10**	**GEN**		**General Industry**
136.	**Understand Safety Data Sheets (SDS) and Personal Protective Equipment ({{E) Requirements: When and how to use appropriate personal protective equipment (goggles, gloves, rubber boots, aprons, etc.)**	**OW**	**10**	**GEN**		**General Industry**
137.	**Ability to prepare and administer appropriate safety and environmental procedures and controls.**	**OW**	**7**	**GEN**		**General Industry**
138.	**Understand which personal protective equipment to use, when and why**	**OW**	**10**	**GEN**		**General Industry**
139.	**Understand the safe storage, shelf life and mixing of chemicals**	**OW**	**10**	**GEN**		**General Industry**
140.	**Ability to recognize symbols associated with chemicals and their usage**	**OW**	**10**	**GEN**		**General Industry**

ADDENDUM 1

LIST OF INTERNATIONAL STANDARDS FOR (SPECIAL PROCESS)

SPECIAL PROCESS	DOCUMENT TITLE	DOCUMENT NUMBER
Chemical Process	**Anodic Coatings for Aluminum and Aluminum Alloys**	**MIL-A-8625**
Chemical Process	**Hard Anodic Coating Treatment of Aluminum Alloys**	**AMS2468**
Chemical Process	**Hard Anodic Coating on Aluminum and Aluminum Alloys**	**AMS2469**
Chemical Process	**Anodic Treatment of Aluminum Alloys, Chromic Acid Process**	**AMS2470**
Chemical Process	**Anodic Treatment of Aluminum Alloys Sulfuric Acid Process, Undyed Coating**	**AMS2471**
Chemical Process	**Anodic Treatment of Aluminum Alloys, Sulfuric Acid Process, Dyed**	**AMS2472**