

 161 Thorn Hill Road Warrendale, PA 15086-7527	<b>Program Document CPBOK</b>	<b>PD 6103</b> <b>CPBoK-013/PL-2 REV. (N/A)</b>
		Issued: <b>19-APR-17</b>
		Revised: TBD Superseding: N/A
<b>BODY OF KNOWLEDGE</b>		
<b>ROLE DESCRIPTION:</b> Planner <b>SPECIAL PROCESS:</b> Chemical Processing <b>METHOD:</b> Cleaning: Acid Cleaning, Descaling, Passivation And Electropolishing		
<p>All PRI Qualification<sup>SM</sup> program examinations are created using the applicable PRI Qualification<sup>SM</sup> 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.</p> <p>All BoKs are created by subject matter experts who participate in the PRI Qualification<sup>SM</sup> Body of Knowledge Review Boards. All BoKs are updated periodically according to the latest revision of PRI Qualification<sup>SM</sup> program documentation (PD6100: Industry Managed Special Process Bodies of Knowledge) to ensure consistency with current industry practice</p>		

## 1. INTRODUCTION

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

This document constitutes the PRI Qualification<sup>SM</sup> program BoK for Chemical Processing Acid Cleaning, Descaling, Passivation and Electropolishing, Planner. 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<sup>SM</sup> program examination candidate preparation
- Chemical Processing Examination Review Board (CP-ERB) for the development of PRI Qualification<sup>SM</sup> program examinations
- Candidates taking PRI Qualification<sup>SM</sup> program examinations who wish to prepare in advance

## 2. REFERENCES

PRI Qualification<sup>SM</sup> program documents:

PD6000	Governance & Administration of PRI Qualification <sup>SM</sup> 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<sup>SM</sup> 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 definition of these levels.

**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 PRI Qualification<sup>SM</sup> program examination candidates are recommended to read all documents referenced in section 2 of this document.

As stated in PRI Qualification<sup>SM</sup> 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

5. LEVELS

<i>Descriptors</i>	<b>Level</b>		
	<i>Operator (OP)/Technician(T)</i> <i>For descriptions, please refer to current version of PD6000</i>	<i>Planner (PL)</i> <i>For descriptions, please refer to current version of PD6000</i>	<i>Owner (OW)</i> <i>For descriptions, please refer to current version of PD6000</i>
<b>Chemical Processing Specific Criteria</b>	N/A	N/A	N/A
<b>Technical Knowledge</b>	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.
<b>Experience</b>	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.
<b>Personal Attributes</b>	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.		
<b>Skills</b>	Describes the activities necessary to perform each level of job function to comply with the Body of Knowledge		
<b>Non-Special Process Related Requirements</b>	Health & Safety, Environmental, Quality System Requirements.		

6. TABLE 1

ROLE DESCRIPTION: PLANNER

SPECIAL PROCESS: CHEMICAL PROCESSING

METHOD: CLEANING / Acid Cleaning, Descaling, Passivation and Electropolishing

REFERENCE GUIDELINES: Addendum 1 is a list of the International Standards and Reference Documents applicable to Cleaning

Row #	COMPETENCE	Weight (1,3,7,10)	Exam Type Written/ Practical	Reference Guidelines
	<b>KNOWLEDGE:</b> The basic knowledge of the special processes, methods and tools			
	<b>GENERAL</b>			
1	Understand the scope and limitations of the process	10	W	General Industry
2	Understand the cleaning process to avoid any unnecessary damage	10	W	General Industry
3	Understand and have ability to sequence operating procedures to meet multiple specifications and process intent	10	W	General Industry
4	Complete understanding of reviewing customer requirements and developing process sheets and internal work instructions	10	W	General Industry AC7108/12; 6.1.2.3.2
5	Ability to access all needed specifications and other customer requirements	10	P	General Industry
6	Understanding tank identifications, sizes/volume, constituents, temperature ranges, and agitation requirements	10	W	AC7108/12; 5.1.1, 5.3.2, 5.3.3, 5.3.4
7	Knowledge and understanding in the controlled use of compressed air supply	10	W	AC7108/12; 5.1.2
8	Knowledge and Understanding of periodic testing, test coupon traceability, solution control and sampling plans	10	W	AC7108/12; 6.1.2.3.3, 6.1.2.3.5
9	Knowledge and understanding of adequate in-process visual inspections to assure process compliance	7	W	AC7108/12; 6.1.3.3.3
10	Knowledge and Understanding of critical timing of certain process steps	10	W	General Industry AC7108/12, 6.1.3.12
	<b>MAINTENANCE</b>			
11	Knowledge and understanding of the care and maintenance of cleaning solutions	7	W	AC7108/12; 5.2.1
	<b>PROCESS LINE EQUIPMENT</b>			
12	Knowledge and Understanding the visual inspection of hardware and fixtures	10	P	AC7108/12; 6.1.3.3.3; 6.1.3.6.2
13	Understanding suitable and adequate racking and fixturing	10	P	General Industry AC7108/12; 5.3.1; 6.1.3.6.3; 6.1.3.6.4; 6.1.3.6.5
14	Knowledge of water purity requirements used in cleaning process	10	W	General Industry AC7108/12; 5.3.5, 5.11.5; 5.11.7
	<b>THERMAL TREATMENTS, HEATING PROCESSES, PART DRYING</b>			
15	Knowledge and Understanding of part drying techniques/requirements	10	P	General Industry AC7108/12; 5.4.1
	<b>CLEANING PROCEDURES</b>			
16	Knowledge and Understanding of part alloys and cleaning solution compatibility	10	W	General Industry AC7108/12; 5.1.1, 5.1.2
17	Knowledge and Understanding of the sequencing of cleaning processes	7	W	General Industry AC7108/12; 6.1.3.7.1
18	Knowledge and Understanding of processes susceptible to hydrogen embrittlement or generation of hydrogen	10	W	AC7108/12; 5.5.2
19	Knowledge and Understanding of surface contaminant removal	10	W	AC7108/12; 6.1.3.2.1
20	Knowledge and Understanding of cleanliness verification for different substrates and geometries	10	W	AC7108/12; 6.1.3.7
	<b>MECHANICAL CLEANING</b>			
21	Knowledge and Understanding of different blast media, including control and segregation	10	W	AC7108/12; 5.6.1, 5.6.2, 5.6.3
22	Knowledge and Understanding of off-set distances and pressures	10	W	AC7108/12;

23	Knowledge and Understanding of surface finish measuring/evaluation	10	W	6.1.3.3.1 AC7108/12; 6.1.3.3.2
	<b>CHEMICAL CLEANING PRIOR TO ACID CLEANING, DESCALING &amp; PASSIVATION</b>			
24	General understanding of incompatibility of cathodic cleaning and high strength steels	10	10	AC7108/12; 5.7.1
25	Knowledge and Understanding of a water break free surface	10	W	AC7108/12; 5.7.2, 5.7.3; 6.1.3.7.2
26	Knowledge and Understanding of masking use, materials, and removal	7	W	AC7108/12; 5.8.1; 6.1.3.5; 6.1.3.13
	<b>POWER SUPPLIES</b>			
27	Knowledge and Understanding of calibration requirements for ammeters and voltmeters	7	W	Customer Requirements AC7108/12; 5.9.1
28	Knowledge and Understanding of resolution of power meters and ranges required	7	W	Customer Requirements AC7108/12; 5.9.2
29	Knowledge and Understanding the traceability of rectifiers to particular tank/hardware	7	W	AC7108/12; 5.9.3
	<b>TIMERS</b>			
30	Knowledge and understanding of calibrated timers used in processing	10	W	AC7108/12; 5.10.1
	<b>TITANIUM CLEANING, DESCALING AND HANDLING</b>			
31	Knowledge and Understanding of alkaline cleaning and scale removal	7	W	AC7108/12; 5.11.1
32	Knowledge and Understanding of the prohibitive use of anodic alkaline cleaning, methanol, and halogenated and titanium	10	W	AC7108/12; 5.11.12
33	Knowledge of proper cleaning and rinsing techniques to assure thoroughness of cleaning	10	W	AC7108/12; 5.11.4
34	Knowledge and understanding of assuring continued cleanliness with use of gloves, etc.	10	W	AC7108/12; 5.11.6
35	Knowledge and understanding in the use of precision measuring instruments	3	W	ISO 10012
36	Knowledge and understanding of post process thermal treatments i.e. hydrogen embrittlement	7	W	ASTM E 230, ASM 2750
	<b>SKILLS:</b> Defined within these rolls describes the range of skills. The skills required to perform a particular special process task			
37	Ability to read, interpret and understand written instructions	10	W	General Industry
38	Ability to perform adequate contract review and customer flow-down requirements	10	W	General Industry
39	Ability to write work instructions and procedures	7	W	General Industry
40	Ability to verify accuracy of the process	10	W	General Industry
41	Ability to discover, document and correct problems and non-conformances	10	W	General Industry
42	Ability to choose correct equipment and tank constituents for the process	10	W	General Industry
43	Ability to read drawings/blueprints and customer specifications	10	W	General Industry
44	Ability to interpret specification requirements	10	W	General Industry
45	Ability to set up process (fixtures/racking, baths/solutions, timers, temperatures, etc.).	10	W	General Industry
46	Ability to understand work traveler/shop papers, and follow through	7	W	General Industry
47	Ability to understand technician's ability and training needs	7	W	General Industry
	<b>PERSONAL ATTRIBUTES:</b> Are statements that will enable judgment of the person's personal attributes			
48	Ability to Work Independently with little supervision	NA	NA	
49	Possess high ethics and integrity	NA	NA	
50	Exceptional attention to detail	NA	NA	
51	Flexible	NA	NA	
52	Tolerate stress well	NA	NA	
53	Ability to make decisions	NA	NA	
54	Team Player	NA	NA	
55	Problem solver	NA	NA	
56	Leadership	NA	NA	
	<b>EXPERIENCE:</b> Are the minimum experience requirement expected to demonstrate their competence.			
57	High School Diploma or GED	NA	NA	
58	6 months in related industry (Quality, Chemistry, Nondestructive Testing, etc.).	NA	NA	
	<b>NON-SPECIAL PROCESS RELATED REQUIREMENTS:</b> Defined within these rolls are other general or pre-requisite needed			
59	General understanding of Quality Systems (AS9100) or equivalent			
60	Knowledge and understanding of safety and handling of hazardous materials and chemicals.			
61	General understanding of storage requirements of hazardous materials			
62	Ability to read and interpret Material Safety Data Sheets (MSDS)			
63	Knowledge of proper Personal Protective Equipment (PPE) requirements (goggles, gloves, etc.)			

**7. DOCUMENT REVISION HISTORY**

<b>REVISION DATE</b>	<b>SUMMARY</b>
3 December 2019	Editorial revision to update program name from eQualified to PRI Qualification <sup>SM</sup> .

**ADDENDUM 1**

**LIST OF INTERNATIONAL STANDARDS & REFERENCE DOCUMENTS FOR CHEMICAL PROCESSING / CLEANING**

<b>SPECIAL PROCESS</b>	<b>DOCUMENT TITLE</b>	<b>DOCUMENT NUMBER</b>
Chemical Process	Standard Methods of Analysis of Sulfochromate Etch Solution Used in Surface Preparation of Aluminum	ASTM D2674
Chemical Process	Audit Criteria for Chemical Processing	AC7108 (Rev H)
Chemical Process	Audit Criteria for Acid Cleaning, Descaling, Passivation and Electropolishing	AC7108/12 (Rev-NC)
Chemical Process	Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment	ISO 10012
Chemical Process	Thermocouple – Electromotive Force (EMT) Tables for Standardized Thermocouples	ASTM E 230
Pyrometry	Pyrometry (includes Thermal Processing Equipment)	AMS 2750
Chemical Process	Passivation of Corrosion Resistant Steel	AMS 2700
Chemical Process	Hydrogen Embrittlement Relief Baking of Steel Parts	AMS 2759/5
Chemical Process	Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems	ASTM A 380
Chemical Process	Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts	ASTM A 967
Chemical Process	Standard Guide for Descaling and Cleaning of Titanium	ASTM B 600
Chemical Process	Test Method for Hydrophobic Surface Film by the Water Break Test	ASTM F 22



## 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>)