Section Title: Appendix - Sections
Document Title: Pratt & Whitney Materials Control Laboratory Qualified Commercial Laboratory List

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APPLIES TO: **Pratt & Whitney Group**

1. PURPOSE AND SCOPE:

This Appendix provides a listing of Commercial Laboratories Qualified by the Pratt & Whitney Group, Materials Control Laboratory (formerly Quality & Standards Laboratory), and identifies the Type of Testing that each listed Laboratory is qualified for.

2. OWNERSHIP AND APPROVAL:

The Chief, Materials Control Laboratory (MCL) PW South & Supervisor Supplier Metallurgical Development PW North, are the owners of this procedure. All revisions to this procedure must be approved by the owners and balloted in accordance with MCL Manual Section C-5.

3. DEFINITIONS:

3.1 **Pratt & Whitney Group** – encompasses both Pratt & Whitney Canada (PW North) and Pratt &Whitney US (PW South).

3.2 **Semi-quantitative Spectrographic Analysis** – The Determination of a material's chemistry to detect the presence of the alloying elements to a degree by which a positive identification can be made as to the alloy type, as well as the ability to distinguish between similar alloys.

3.3 **Quantitative Spectrographic Analysis** – P&W defines quantitative spectrographic analysis as “utilization of a least squares calibration curve”.

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3.4 **Wet Chemical Analysis** – P&W defines wet chemical analysis as "gravimetric or titrametric analysis" of metallic component to identify alloys. This is not process solution analysis.

3.5 **Optical Emission Spectroscopy (OES)** – OES is defined as testing which utilizes "ICP (Inductively Coupled Plasma), DCP (Direct Current Plasma) and DR (Direct Reader)".

4. PROCEDURE:

4.1 The commercial laboratories listed in Table I have been reviewed by Pratt & Whitney-Materials Group Control Laboratory (P&W-MCL) and found capable of performing the types of tests for which they are listed (Table II). This list shall not be construed as a guarantee by P&W-MCL that testing will be done properly, nor does it relieve the supplier from his contractual obligation to deliver conforming materials and parts based on accurate and valid test results.

4.2 The listing of a laboratory in the Table signifies only that, at the time of review, the laboratory was found capable of performing the tests for which it is listed. The laboratory is not relieved of responsibility for continued conformance as determined by calibrations and operational checks of testing and measuring equipment.

4.3 This list shall not be reproduced without written permission from P&W-MCL and should not be considered completely up-to-date at any time, as deletions and additions may be made by P&W-MCL.

4.4 Laboratories listed in Table I are required to comply with MCL Manual Section F-23, "Test and Calibration Requirements for Commercial and In-House Laboratories", when that Section is specified on orders from their customers. Failure to comply with MCL Manual Section F-23 will disqualify the laboratory as a testing source for materials or parts.

4.5 At the discretion of P&W-MCL, any laboratory may be removed from this listing either by code (Table II) or its entirety (Table I) when no longer deemed qualified or when the services are no longer required by P&W or its subcontractors.

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4.6 The following laboratories may be used for qualitative analysis using mass spectrograph for information only and will not be surveyed:

- Accu-Labs Research, Inc.
  11485 West 48th Avenue
  Wheat Ridge, CO 80033
- Commercial Testing & Engineering Company
  Instrumental Analysis Division
  14335 West 44th Avenue
  Golden, CO 80401
- Ledoux & Company
  359 Alfred Avenue
  Teaneck, NJ 07666

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TABLE I

COMMERCIAL LABORATORIES	SMC	TYPE OF TESTING (See TABLE II of TEST CODES)	
		Approved Testing	Limited Testing
Advanced Plastic & Material Testing Inc. 42 Dutch Mill Road Ithaca, NY 14850 USA	**Meehan**	1 ,5, 6, 7, 7A, 9, 10, 13, 15, 16, 18, 23, 25, 26, 27	
Allegheny Technologies Limited Commercial Testing Services Blackmore Street, Sheffield S4 7TZ United Kingdom	**Capstick**	9, 12, 12a, 17, 17a	
ATI Wah Chang 1600 N.E. Old Salem Road P.O. Box 460 Albany, Oregon 97321 USA	**Baker**	9, 12, 13	
Atlas Testing Labs 9820 6th Street Rancho Cucamonga California 91730 USA	**Castillo**	1, 2, 3, 5, 6, 7, 7a, 8, 9, 10, 11, 12, 12a, 13, 20a	
Connecticut Metallurgical 100 Prestige Park Road East Hartford, Connecticut 06108 USA	**Bissell**	1, 2, 3, 4, 5, 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, 9, 10, 11, 12, 13, 15, 16, 23, 35	12a - only (O, N)
Dickson Testing 11126 Palmer Avenue Southgate, California 90280 USA	**Kirilov**	1, 2, 3, 4, 5, 6, 7, 7a, 7c, 7h, 8, 9, 11, 12, 12a, 13, 17, 21	17a- only (Pb, Bi, Se, Te, Tl), 18 -only (Y)
Dirats Laboratory 41 Airport Road P.O. Box 39 Westfield, Massachusetts 01086 USA	**Bissell**	1, 2, 3, 4, 5, 6, 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, 9, 10, 11, 12, 12a, 13, 14, 17, 20a, 21, 22, 23, 28, 35, 38	17a- Only(Pb, Bi, Se, Te, Tl), 18 - only (Y) 19 -only (R)

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TABLE I

COMMERCIAL LABORATORIES	SMC	TYPE OF TESTING (See TABLE II of TEST CODES) Approved Testing	Limited Testing
EAG Laboratories 103 Commerce Blvd. Liverpool, NY 13088 USA	**Meehan**	24	
Eaton Aerospace Laboratories 23555 Euclid Avenue Cleveland, Ohio 44117	**Viau**	1, 2, 3, 5, 7, 7A, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 23	17a - only (Pb, Bi, Se, Te, Tl, Ni Base Alloys)
Element Materials Technology - Burlington 1440 Graham's Lane Unit 11 Burlington, Ontario L7S 1W3 CANADA	**Vaidya**	8, 9	
Element Materials Technology Canada Inc - Cambridge Laboratory 15 Highridge Court Cambridge, Ontario N1R 7L3 CANADA	**Vaidya**	1, 5, 7, 7a, 7h, 8, 9, 29	
Element Materials Technology - Charlotte 1200 Westinghouse Blvd., Suite A Charlotte, NC 28273-6313	**Thornton**	1, 2, 3, 4, 7, 7a	
Element Materials Technology - Cleveland 5405 Schaaf Road Cleveland, Ohio 44131	**Viau**	1, 2, 3, 4, 5, 6, 7, 7a, 7b, 7c, 7d, 7e, 7f, 8, 9, 11, 12, 12a, 13, 17, 18	17a - only (Pb, Bi, Se, Te)
Element Materials Technology - Daleville 9301 Innovation Drive Suite 175 Daleville, IN 47334-0569 USA	**Sys**	1, 2, 3, 4, 5, 7, 7a, 7c, 7d, 7e, 7f, 7h, 8, 9, 10, 11, 12, 12a, 13, 17, 18	17a - only (Pb, Bi, Se, Te, Tl)
Element Materials Technology - Duarte 1857 Business Center Drive Duarte, CA 91010	**Tam**	15, 16, 25, 26, 27	
Element Materials Technology - Fairfield 3701 Port Union Road Fairfield, Ohio 45014 USA	**Easton**	20b, 21	
Element Materials Technology. - Glendale Heights Lab 194 International Blvd Glendale Heights, Illinois 60139	**Winn**	1, 2, 3, 5, 6, 7, 7a, 7b, 7c, 7d, 7e, 7f, 7h, 8, 9, 11, 12, 12a, 13, 17, 20a, 21	

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TABLE I

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		Approved Testing	Limited Testing
Element Materials Technology - Huntington Beach 15062 Bolsa Chica Huntington Beach, California 92649	**Kirilov**	1, 2, 3, 4, 5, 6, 7, 7a, 7c, 7e, 7g, 8, 9, 10, 11, 12, 12a, 13, 17, 17a, 18, 20a, 21	
Element Materials Technology - Monterrey Carretera Monterrey-Saltillo #3279-B Col: Privade de Santa Catarina Santa Catarina, Nuevo Leon, Mexico	**Farmer**	1, 2, 3, 5, 7, 7a, 12a	
Element Materials Technology - New Berlin 3200 S. 166th Street New Berlin, Wisconsin 53151-2701 USA	**Winn**	1, 5, 7, 7a, 8, 9, 12, 13	
Element Materials Technology - Newtown 2 Pheasant Run Newtown, Pennsylvania 18940 USA	**McCallister**	1, 2, 3, 5, 6, 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, 9, 10, 11, 12a, 13, 35	
Element Materials Technology - Plzen Podnikatelska 39 Plzen 301 00, Czech Republic	**Nykles**	1, 2, 3, 4, 5, 7, 7a, 7c, 11	12a - Only (H and O)
Element Materials Technology (Shanghai) Co., Ltd 1st Floor, Bolck 7, No. 398 Songying Road, Qingpu District, Shanghai, China 201703	**Hoa**		7 – Replica only
Element Materials Technology - Montreal 104 A.V. Nordic Pointe-Claire, Québec H9R 3Y2, QC CANADA	**Vaidya**	1, 5, 7a, 7e, 10, 35	
Element Materials Technology - Teesside Holwick Road Middlesborough TS2 1QS United Kingdom	**Jones**	9, 12, 12a	
FMI Chemical Corporation 4 Northwood Drive Bloomfield, CT 06002	**Booth**	16, 25, 26	

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TABLE I

COMMERCIAL LABORATORIES	SMC	TYPE OF TESTING (See TABLE II of TEST CODES)	
		Approved Testing	Limited Testing
Genitest Inc. 3472 Frontenac Montréal, Québec. H2K 3A5 CANADA	**Lu**	1, 5, 7, 7a, 7e, 7f, 7h, 8, 9, 12, 13, 29	
Hill Engineering 3083 Gold Canal Drive, Suite 100 Rancho Cordova, CA 95670 USA	**Le**		36 - Only (S)
IHI Master Metal Co. LTD 5292 Aioi, Aioi-shi, Hyogo Pref. 678-0041 Japan	**Kado**	9, 12, 18	9 - Only (Ni, Co), 18 - Only (Ni, Co), 24 - Only (G)
IMR KHA - Portland 5687 S. E. International Way, Ste. A Portland, Oregon 97222	**Baker**	1, 2, 3, 4, 5, 6, 7, 7a, 7f, 9, 11, 12, 12a, 13	
IMR Metallurgical Services 4510 Robards Lane Louisville, KY 40218 USA	**Easton**	1, 2, 3, 5, 6, 7a, 7c, 7h, 9, 10, 12, 13, 19	
IMR Singapore Pte. Ltd. 30 Loyang Way #03-16 Singapore 508769	**Na**	1, 2, 3, 4, 5, 7a, 7b, 7c, 7d, 7e, 7f, 7h, 9, 12, 12a	
IMR Test Labs 131 Woodsedge Drive Lansing, New York 14882 USA	**Meehan/Bissell**	1, 2, 5, 6, 7, 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, 7i, 7k, 9, 10, 11, 12, 12a, 13, 14, 15, 16, 18, 20a, 21, 23, 24, 25, 26, 27, 28, 33	
IncoTest Homer Road Hereford, HR4 9SL United Kingdom	**Cerbone**	1, 2, 3, 4, 5, 6, 7, 7a, 8, 9, 11, 12, 12a, 13, 18	
Joliet Metallurgical Laboratories 305 North Republic Avenue Joliet, Illinois 60435 USA	**Winn**	1, 2, 3, 4,	
Kiguchi Techniques 114-15 Enoshima Yasugi, Simane 692-0057 Japan	**Kado**	1, 2, 3, 4, 5, 7a, 7h	
Kobe Material Testing Laboratory Co Ltd 47-13 Nijima, Harima-cho Kako-gun, Hyogo 675-0155 Japan	**Kado**	1, 3, 7a, 7d, 7e, 7f, 7h	

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COMMERCIAL LABORATORIES	SMC	TYPE OF TESTING (See TABLE II of TEST CODES)	
		Approved Testing	Limited Testing
Laboratory Testing Inc. 2331 Topaz Drive Hatfield, Pennsylvania 19440 USA	**McCallister**	1, 2, 3, 5, 6, 7, 7a, 7c, 7d, 7e, 7f, 7g, 7h, 8, 9, 10, 11, 12, 12a, 13, 21, 22 24, 25	
Luvak Inc. P.O. Box 597 Boylston, Massachusetts 01505-597 USA	**Berube**	8, 9, 12, 12a, 13, 17	17a - only (Pb, Bi, Te, Tl)
Massachusetts Materials Research, Inc. 1500 Century Drive West Boylston, Massachusetts 01583 USA	**Bissell**	1, 5, 6, 7, 7a, 7c, 7d, 7e, 7f, 7h, 8, 9, 12, 12a, 13, 30	
MB Aerospace Technologies Sp. Z o.o. Plant 1 Poland	**Skoczylas**	5, 7, 7d, 7e, 7f, 7h, 11	7i - only PWC
Metals Technology Inc. 19801 Nordoff Street Northridge, California 91324 USA	**Kirilov**	1, 2, 3, 4, 5, 6, 7, 7a, 7c, 7g, 7h, 9, 11, 12, 12a, 13, 20a, 30, 32	17a - only (Pb, Bi, Wrought Alloys only)
Northern Analytical Laboratory, Inc 13 Delta Dr. Unit #4 Londonderry, NH 03053 USA	**Berube**	24	
NSL Analytical Services Inc. 4450 Cranwood Parkway Cleveland, Ohio 44128 USA	**Viau**	8, 9, 12, 12a, 13, 14, 17, 18, 24, 28	17a -only (Se, Te)
NSL Metallurgical 4535 Renaissance Pkway Cleveland, OH 44128 USA	**Viau**	1, 5, 6, 7, 7g, 7h, 11, 13, 23	
Omega Research Inc. 1205 Texas Star, Parkway Euless Texas, 76040 USA	**Farmer**	5, 10, 35	
Pratt & Whitney Rzeszów S.A. Hetmanska 120 Rzeszow, Poland 35-959	**Kobylarz**	1, 3, 4, 5, 7, 7a, 7b, 7b, 7c, 7d, 7e 7f, 7h, 7i, 8, 10, 23, 29	

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TABLE I

COMMERCIAL LABORATORIES	SMC	TYPE OF TESTING (See TABLE II of TEST CODES)	
		Approved Testing	Limited Testing
Product Evaluation Systems Inc. 637 Donohoe Rd. Latrobe, PA 15650 USA	**Maurice**	1, 2, 3, 5, 6, 7, 7a, 7c, 9, 11, 12, 12a, 20b, 21	
R&D Laboratory for Aerospace Materials Rzeszow University of Technology Ul. W.Pola 2 Rzeszow, Poland 35-959	**Kobylarz**	1, 2, 3, 5, 7, 7a, 9, 29	
RTM Breda S.r.l. Via Biancge 18 Carre' (VI) Italy 36010	**Nykles**	1, 2, 3, 5, 7, 7a, 9	
Singapore Test Services PTE Ltd. 249 Jalan Boon Lay Jurong Town, Singapore 619523	**Na**	8, 9	
Sturbridge Metallurgical Services (SMS), Inc. 8 Picker Road P.O. Box 704 Sturbridge, MA 01566	**Bissell**	7, 7a, 7c, 7e, 7f	
Westmoreland Mechanical Testing & Research Inc P.O. Box 388 Youngstown, Pennsylvania 15696 USA	**Maurice**	1, 2, 3, 4, 5, 6, 7, 7a, 7f, 9, 11, 12, 12a, 13, 17, 20b, 21, 31, 33, 34	

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TABLE II	
Specific Test Codes	**Testing Description** **Yellow highlighted fields require proficiency testing per MCLM F23**
1	Tensile, Room Temperature
2	Tensile, Elevated Temperature
3	Stress Rupture
4	Creep Rupture
5	Hardness (all hardness not covered by HIM Code 1)
6	Impact
7	Metallographic Examination - Not covered by another suffix (See Note 9)
7-a	ME - Microstructure/Grainsize
7-b	ME - Abusive Machining
7-c	ME - Surface Contamination of Titanium
7-d	ME - Braze
7-e	ME - Weld
7-f	ME - Nonconventional Machining (ECMR, EDMR, LBMR, EBMR, Chem milling)
7-g	ME - Fasteners
7-h	ME - Heat Treat
7-i	ME - Coatings (Vapor/Pack/Thermal)
7-k	ME - Non-Metallic Macro/Microscopic Evaluation
8	Wet Chemical Analysis (See Note 2)
9	OES Quantitative Spectrographic Analysis (See Notes 3, 4, & 5)
10	Salt Spray
11	Heat Treating (to condition lab specimens)
12	Gas Analysis - Combustion (C, S)
12-a	Gas Analysis - Inert Gas Fusion O-Oxygen, N-Nitrogen, H-Hydrogen
13	Semi-quantitative Analysis (See Note 1)
14	Sieve Analysis
15	Plastics (See Note 8)
16	Rubber Materials including Polymers (See Note 8)

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TABLE II	
Specific Test Codes	**Testing Description** **Yellow highlighted fields require proficiency testing per MCLM F23**
17	Atomic Absorption (See Notes 5 & 6)
17-a	AA - Tramp Elements (See Notes 5 & 6)
18	XRF Quantitative Spectrographic Analysis - All Others (See Notes 4 & 5)
19	XRD (see Note 7)
20a	Fastener Fatigue
20b	Low Cycle Fatigue
21	Fracture Toughness
23	Microscopic Contamination Analysis-SEM
24	Mass Spectroscopy(See Note 11)
25	NonMetallics - Tensile/Compressive
26	NonMetallics -Uncured Properties
27	NonMetallics - Flex/Short Beam
28	Particles Size Distribution - Laser Light Scattering
29	EDS, EDX or SBS on SEM (semi-quantitaive)
30	Tensile, Cryogenic
31	Cryogenic, Coefficient of Thermal Expansion
32	Humid Stress Rupture
33	RT and ET - Coefficient of Thermal Expansion
34	Thermal Conductivity - Metal
35	Plating Embrittlement
36	Residual Stress Measurement for Low Plasticity Burnishing (see Note 10)
37	Hardenability on Disc & Jominy
38	Stress Corrosion (See Note 12)

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Notes:

1. P&W defines semi-quantitative spectrographic analysis as "The Determination of a material's chemistry to detect the presence of the alloying elements to a degree by which a positive identification can be made as to the alloy type, as well as the ability to distinguish between similar alloys".
2. P&W defines wet chemical analysis as "gravimetric or titrametric analysis" for the determination of metallic components. This is not process solution chemistry.
3. ICP, DCP, Direct Reader.
4. P&W defines quantitative analysis as "utilization of a least squares calibration curve".
5. Code numbers with an element suffix (e.g.; 17Pb) designate qualification for analysis of that element on cast turbine airfoil alloys by the specified test method.
6. The letter "C" suffix to Code 17 (Atomic Absorption) also designates qualification for residual cerrobend analysis in hollow core blades and vanes.
7. The letter "R" suffix to Code 19 (XRD) also designates qualification for retained austenite.
8. Qualification for Codes 15 and 16 is not required for simple identification tests such as those listed in MCL Manual Section S-8.
9. Code 7 does not include metallographic examination of thermal spray coatings, pack process diffusion coatings, plasma or vapor deposition coatings at qualified commercial laboratories.
10. The letter "R" indicates the Ring Core Method, "S" indicates Slotting Method, "X" indicates XRD Method.
11. Calibration per note 4 does not apply. Analysis is limited to concentrations of 10ppm and below. Analyses above this level may be approved by the cognizant SMCS on a case by case, element specific basis. The letter “G” suffix to Code 24 indicates the glow discharge (GSMS) method. The letter “I” suffix to Code 24 indicates the ICP (ICP-MS) method.
12. The letter "P" indicates E-205 and the letter "A" indicates ASTM F 945.

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5. **FORMS:**

- MCL Form 404

6. **REFERENCES:**

- MCL Manual Section C-5
- MCL Manual Section F-23
- MCL Manual Section S-8

7. **NATURE OF CHANGE FOR THIS ISSUE:**

- Updated SMC names to ATI Wah Chang, Atlas Testing Labs, Dickson Testing, CMI, Dirats, Eaton Aerospace Laboratories, Element Materials Technology – Cleveland, Element Materials Technology – Duarte, Element Materials Technology – Fairfield, Element Materials Technology. - Glendale Heights Lab, Element Materials Technology Monterray, Element Materials Technology - New Berlin, FMI Chemicals, Hill Engineering, IMR Portland, IMR Louisville, IMR NY, Joilet, NSL Analytical Services Inc., NSL Metallurgical, MMR, Omega, Product Evaluations, Sturbridge Metallurgical, Westmoreland
- Added code 2 to IMR Test Labs in Table I
- Added code 29 to R&D Lab in Table I
- Revise code 5 in Table II

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