

PERFORMANCE COATINGS INTERNATIONAL LABORATORIES, LLC		
Title: Inspection and Sampling Plans for Customer Supplied Materials		
Quality Assurance Procedure: PCI-S 01A	Rev: 08	Page: 1 of 8
Approved By: Nerine Peterkin, QA Manager	Effective Date: March 5, 2010	

Approved By:	Date: 3/5/10
George E. Drazinakis, President	
Approved By:	Date: 3/5/10
Nerine Peterkin, Quality Manager	



CHANGE CONTROL			
Rev	Approval	Date	Revision History
01	Bob La Rocco	4/24/99	Initial Release
02	Nerine Peterkin	2/10/04	Reformatted- No changes were made.
03	Nerine Peterkin	6/1/06	Re-wrote entire procedure combining both optical-cosmetic standards with PCI's typical quality inspection plans.
04	Nerine Peterkin	9/7/07	Page 5, section 6.6.1-add 100% inspection for class "A" only. Page 6, section 6.6.2, add sampling plan using MIL-STD 105.D for class "B" inspection only.
05	Nerine Peterkin	6/10/08	Page 5, section 6.6 – review and revised sampling plan Using 100% level of inspection for incoming (A1) only and at customer's request. B1 will be for all incoming and outgoing material unless otherwise noted.
06	Nerine Peterkin	3/5/10	Page 2 (REFERENCES) change ISO 9001-2000 to read ISO Standard.

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07	George Drazinakis	12/4/14	Restated Purpose, Scope and updated References. Rewrote Definitions (AQL, Gloss and Light Transmittance.) Revised section 6.1.1, 6.2.1, 6.2.2 and 6.2.3. Rewrote Section 6.3 Optical Cosmetic Standards and updated section 6.3.4. Added measuring loop info. Reformatted Section 6.4 sampling plans and added note on section 6.4.2 Added improper parts handling by customer on section 6.5.
08	George Drazinakis	2/15/17	Revised section 6.1, adding mandatory incoming inspection for all customer supplied parts. Added new sections 6.6 Forms and 6.7 Records retention period.

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1. PURPOSE

To provide explanation and uniform optical inspection criteria of PCI Lab's Quality Cosmetic Standards and available Quality Inspection Sampling Plans.

2. SCOPE

This procedure applies to all PCI Labs manufactured and customer supplied products.
 Note: Not all Quality Inspection Sampling Plans are available for all types of work performed.

3. REFERENCES

Quality Manual
 ISO-STD Section 7.5.1 - Control of Production and Service Provision
 MIL-STD-105E, ISO 2859-1 (1999)
 ANSI/ASQ Z1.4 - 2003/2008

4. DEFINITIONS

Non-Conforming - Any article that does not conform to specifications.

Defect – A non-conformity to specifications in one or more quality characteristics.

Acceptance Number – Is the maximum allowable number of defective articles in the sample that will permit acceptance of the lot or batch.

AQL – Acceptable Quality Level is the maximum percent defective (i.e. max number of defects per 100 units,) that for purposes of sampling inspection can be considered satisfactory as a process average.

Gloss – is a visual surface impression of how light is reflected and is measured by the specular reflection of light from a smooth surface. On rough surfaces light is diffusely scattered in all directions and the duller the surface appears.

Light Transmittance – Total transmittance is the ratio of transmitted to incident light. It is measured in percent of clarity and haze, with opaque being 0% and no resistance to incident light being 100% (no absorption and no reflection in the substrate).

5. RESPONSIBILITIES

Quality Assurance Manager
 Operations Manager
 Inspectors
 Operations Associates
 R&D Manager

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6. PROCEDURE

6.1 Base Materials

- 6.1.1 PCI Labs does not manufacture any plastic basic materials such as injection-molded parts or extruded sheets. Variations in the cosmetic attributes of plastic sheets or molded parts are determined by the type and quality of the resins used, process and level of cleanliness and controls used by the original manufacturer (OEM.) Possible defects in the substrate material include: scratches, pinholes/craters (a shallow depression), gels, bubbles (air trapped), black specs, inclusions (impurities, foreign materials,) etc. An incoming, general inspection Level II (2.5% for major defects and 4.0% for minor defects, MIL-STD-105E) will be performed to ensure compliance with PCI Labs' acceptable quality criteria. At the discretion of the Quality Manager or at customer's request, a different (tighter) QC incoming inspection level may be performed.
- 6.1.2 If non-conformances are found in the base materials that will influence the finished product, the QA Manager will notify customer before proceeding with the coating process.
- 6.1.3 A written waiver will be required to allow processing of non-conforming parts. Waiver acceptance will automatically change the Quality Class to "C3," see below.

6.2 Gloss and Light Tolerances

- 6.2.1 The original manufacturers of extruded or cast plastic sheets and/or injection molded or cast parts provide their own quality standards that vary depending on appearance, thickness, and color of the material. We will be happy to provide you with the manufacturer's standards for all materials used in production. The following tolerances are over and above any standards offered by the original material manufacturer (OEM.)

Gloss

- 6.2.2 When a part or sheet is coated with our Vueguard™ Anti-Glare (AG) Coatings, the gloss tolerance shall not exceed ± 5 gloss units as measured by BYK micro-gloss 60° Gloss meter.
Example: A part coated with our Vueguard™ Anti-Glare 54 coating can range from 49 to 59 gloss units (on a 24" x 48" wide sheet). Tighter gloss range can be expected for smaller sheets or part sizes.

Light Transmission

- 6.2.3 Light transmittance consists of the directly transmitted and diffused components and is measured in percent of clarity (and haze), with opaque being 0% (very low gloss) and no resistance to light being 100%. Typical PC light transmission is 92%, typical PMMA light transmission is 90%.

Materials coated with any of PCI Labs Vueguard™ WC (water clear) coatings shall maintain a light transmission tolerance not to exceed – 3% beyond the transmission

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standard offered by the manufacturer of the base material. On materials coated on two sides, the light transmission tolerance may double to less than - 6%.

6.3 Optical Cosmetic Standards

Cosmetic standards are established by performing a visual inspection and finding inclusions (marks that appear to be somewhat round) and **scratches** (marks that appear to be long and thin). This standard quantifies the number and size of allowable “marks” in three available classes.

6.3.1 Class “A”

Applies to parts made by PCI Labs or Customer Supplied parts up to 144 square inches of contiguous “critical” optically visible area. **Sheet materials are not covered at this cosmetic standard.**

Inclusions /Scratches:

<u>Size (in.)</u>	<u>Quantity</u>	<u>Distance</u>
> .020 Ø	0	N/A
> .010 to .020 Ø	4	1”
< .010 Ø	50	1/8”

6.3.2 Class “B”

6.3.2.1 Applies to sheets only; as supplied by PCI Labs or is Customer supplied sheet material.

Inclusions / Scratches:

<u>Size (in.)</u>	<u>Quantity</u>	<u>Distance</u>
> .030 Ø	0	N/A
.020 to .030 Ø	4	1”
.010 to .019 Ø	8	1”
< .010 Ø	Unlimited	1/8”

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6.3.2.2 Applies to Customer Supplied (mostly injection molded) parts with a “critical” optical visible area of less than one square foot.

Part Size	Inclusions & Scratches - Quantity			
	> 0.030"	.020"-.030"	.010"-.019"	<0.010"
≤ 12" x 12"	0	4	8	Unlimited
≤ 9" x 9"	0	3	6	100
≤ 6" x 6"	0	2	4	50
≤ 3" x 3"	0	1	4	25
Separation	N/A	1"	1"	1/8"

6.3.3 Class “C”

Applies to parts made by PCI Labs or Customer Supplied parts of any size and sheet material.

At this Cosmetic Standard, all parts or materials will be shipped to customer “**AS-IS**”. We will not ship any non-conforming materials, unless requested by customer, in writing.

6.3.4 Inspection Procedure

- All subjective optical determinations for the quality level of the parts are to be conducted under a uniform light source of 1000 -1500 lux, by inspectors with 20/20 vision. Viewing time: min-10 / max-20 seconds.
- Inspection distance. Hold the part at arm’s length (approx. 18”) perpendicular to the line of sight (min 14” – max 20”); as you might hold an opened book.
- Rotate the part 90° with the top of the part moving away from the inspector. This movement should take no more than 5 to 8 seconds. If no irregularities are noticed, the part is acceptable. If any inclusions or scratches are found, they shall be measured and acceptance or rejection shall be based on the above cosmetic standards.
- Defect measurement shall be made with a 10X measuring loop with thickness and hole gauge scale reticles. (Such as Edmund’s magnifiers.)

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6.4 Quality Sampling Plans

PLEASE NOTE THAT ALL INCOMING CUSTOMER SUPPLIED PARTS WILL BE INSPECTED USING THE “B1” SAMPLING PLAN BELOW, UNLESS REQUESTED OTHERWISE BY THE CUSTOMER.

6.4.1 Sampling Plan 1: 100% Inspection – Cosmetic Class “A1”

Our highest “Certified Supplier” Quality Level. Upon receipt of a shipment, we will perform a 100% Incoming Inspection. Any parts identified not to meet the agreed upon cosmetic specifications before coating, will be returned to customer or scrapped at customer’s request. The remaining parts will proceed for coating.

After parts are coated, we will perform another 100% inspection. Any parts found to be below the agreed upon standards will be culled from the population and scrapped. Of course, you will not be charged for the coating of these parts. Please note that this level of inspection will be at customer’s request and carries the highest cost.

6.4.2 Sampling Plan 2: MIL-STD-105 E, Level II, AQL- 4.0 – Cosmetic Class “B1”

Combining good monitoring and relatively low production costs; this Quality Plan is our Standard Quality Inspection sampling method of handling the vast majority of work.

Upon receipt of a shipment we will perform an incoming inspection based on a MIL-STD 105 E, Level II, AQL (Acceptable Quality Level) 4.0, reduced plan. If samples PASS inspection at the agreed upon Cosmetic Class, we will proceed with the coating of ALL parts. If the sample FAILS, we will place the parts on hold and e-mail our Standard “Notice of Irregularity” form (PCI-QAF 011) which will offer you various options including a waiver to proceed with coating on an “AS-IS” basis.

After parts are coated we will perform a 100% inspection and cull out defective parts. Defective parts will be kept at PCI Labs for disposal.

6.4.3 Sampling Plan 3: Minimal Inspection – Cosmetic Class “C3”

Our most economical inspection; this plan takes advantage of the inherent quality standards that have been incorporated into our production techniques for over 45 years, but offers no formal sampling procedure.

When parts arrive at our facility they are forwarded directly to our Coating Line Preparation department where they are mounted in carriers and cleaned in exactly the same manner as is utilized in our more discriminating plans. The parts then proceed through the coating process where they are monitored by the line inspector. The Coating

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Line Inspector is empowered to direct adjustments to the equipment during the coating process. The Inspector will also cull out any parts with defects that resulted from an abnormal condition in the coating line.

All parts processed based on the C3 plan will be returned and charged to the customer except for those that have been removed by the Inspector. Claims for credit will only be offered at this very low cost plan, if the fall-out rate exceeds 10%.

This is an ideal plan for parts, where the primary concern is the chemical and abrasion resistance (protection) of the thermoplastic substrate material.

6.5 General Considerations

On all customer-supplied parts or materials, the normal production shrinkage is a maximum of 10%. Credit may be offered if the coating fall-out rate exceeds 10%.

Customer-supplied sheet materials that are found to be defective before or after coating will be returned. There will be no charge for the coating, even if part of the material is still usable. For all other Customer Supplied Parts, please refer to PCI QAP-003 "Return of Rejected Customer Supplied Parts" policy and procedure.

Except by special arrangement, PCI Labs will dispose all parts found to be defective after coating.

Performance Coatings International Labs accepts NO responsibility for the cost of the customer supplied parts or base materials.

The customer agrees to inspect all orders upon receipt. Parts or materials on which subsequent fabrication or improper handling has been performed, shall not be returned for credit.

PCI Labs' Terms & Conditions of Sale (PCI QAF-039) apply.

6.6 Forms

- 6.6.1 Inspection Summary Report: PCI QAF-026
- 6.6.2 Notice of Irregularities in Customer Supplied Parts: PCI QAF-011
- 6.6.3 Certificate of Compliance: PCI QAF-031

6.7 Records

Customer documents generated by this procedure, shall be retained by the Quality Manager for a minimum of 5 years.