



**SCD
PROCUREMENT SPECIFICATION FOR PARYLENE COATED
ASSEMBLIES
SEAKR
CAUTION ASSEMBLY IS ESD SENSITIVE**



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REVISION/CHANGE RECORD

Rev	Document Date	Author	Revision/Change Description	Pages Affected
-	11/09/17	D. Turchi	Initial Release	N/A
A	07/13/18	D. Steinmetz	Adding information on shock watches to the SCD.	6-10
B	12/19/18	J. Stewart	Update Sections 3.5 and 4.0	5-8
C	02/23/21	M. Connell	Creating a generic specification; removing references to a specific supplier	ALL
D	07/19/21	M. Connell	Add UV Tracer edits, ammoniated mask edits and visual quality standard edits.	6-11
E	09/19/24	K. Breitenstein	Adding thickness tolerance, glass coupon, clamshell and inspection verbiage.	6-11
F	07/22/25	T. Riggs	Adding handling/standoff requirements.	5-10

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1 SCOPE

This specification establishes the requirements for parylene coating of SEAKR Printed Board Assemblies (PCBAs). This specification covers the required processes, including masking, coating, handling, inspection, and shipping for a parylene coated PCBA.

This document is intended for use in conjunction with a program specific SCD, in order to establish acceptable engineering product assurance for parylene coated PCBAs. The program specific SCD is to provide details specific to the particular PCBA and program in question.

2 APPLICABLE DOCUMENTS

The following standards and documents apply to this document to the extent specified herein. In the event that there are discrepancies between the referenced documents and this document, the order of precedence shall be as follows:

- a) SEAKR Purchase Order (PO)
- b) SEAKR program specific SCD
- c) This SCD
- d) Other specifications or standards (e.g. military standard, etc.) referenced herein

The latest released revision of this document at the time of the PO is effective.

2.1 Reference Specifications

SEAKR shall be notified of any changes made to the processes called out by these documents.

ANSI/ESD S 20.20

MIL-I-46058

ASTM D3359-09

IPC-7711/7721

J-STD-001

J-STD-001 xS (x is latest revision)

NASA-STD-8739.1

2.2 Abbreviations

C of C	Certificate of Conformance
EIDP	End Item Data Package
PCBA	Printed Circuit Board Assembly
PCB	Printed Circuit Board
PO	Purchase Order
SCD	Source Control Drawing



2.3 Part numbers

Each assembly to be coated has an associated SEAKR Engineering (SEAKR) part number and serial number. These numbers can be found printed on the PCBA (Printed Board Assembly). Reference the PCBA drawing for part number and serial number locations.

2.4 General Description

The finished assembly is made by masking the areas and connectors indicated in the program specific SCD, applying parylene coating, safely removing the masking materials, and inspecting for proper coverage.

3 PARYLENE COATING REQUIREMENTS

3.1 Precautions

Assemblies contain electrostatic sensitive devices (ESD). Suppliers shall observe ESD precautions for handling. Suppliers shall also minimize touching of electronic components while handling the assembly. Assemblies shall be handled using the best applicable location such as Printed Circuit Board (PCB) edges, shipping frame, or designated tooling holes. Gloves are required when handling/touching boards at all times. The use of SEAKR provided nylon standoffs is recommended when possible. To provide additional risk mitigation for leakage onto areas that require masking, standoffs may be removed during processing at supplier's discretion. If supplier provided standoffs or spacers are used, there shall be extra caution used in fastening them to the PCBA. Standoffs or spacers not provided by SEAKR shall be fastened securely in unpopulated areas of the PCBA only. The Supplier must verify ESD protection is compliant to ANSI/ESDA S20.20. ESD bags should only be opened at an approved ESD workstation by grounded personnel. Use of air ionizers is required.

Additional ESD requirements may be outlined in program specific SCDs.

3.2 Environmental Controls

The temperature and humidity shall be monitored in the processing area (all areas where the board is not sealed in an ESD bag). They shall be maintained within the limits defined as the comfort zone (30% - 70% humidity, 65°F - 85°F (18°C - 25°C)). Temperature and humidity variations shall be maintained within process parameters. At humidity levels below 30%, all work shall cease on ESD sensitive assemblies until the humidity level is again within tolerances. Temporary humidifiers may be used to increase the local humidity to an acceptable level. The preferred humidity levels are between 40% and 50%. Prior to masking, washing, plasma etch, and coating, verify the temperature and humidity levels are within allowable limits and record on traveler or run sheet. Temperature and humidity logs to be retained by supplier.

3.3 Materials Used

Materials used for the parylene coating process are detailed below. Note that the use of ammoniated latex masking materials is strictly prohibited unless written approval has been granted by SEAKR Engineering.

The following materials are SEAKR provided:

- Uncoated Printed Board Assembly



- Shockwatch monitors (if required)
- Associated PCBA shipping mechanicals (where applicable)
- Any fasteners or clamshells associated with PCBA/shipping mechanicals (if applicable, extra may be provided)
- 2X ESD bags,
- Desiccant
- Humidity indicator (extra may be provided)
- PCB Witness coupon (1 per lot, where available)

The following materials are provided by the supplier:

- Parylene / UV tracer (if used by the supplier)
- Masking material

Note: *Use of ammoniated Latex masking material is prohibited unless approved by SEAKR Engineering.*

- Aluminum or glass witness coupon (1 per lot)
- Kapton Tape
- A174 Silane Primer

3.4 Supplier Receiving

Supplier shall take photos of the assembly and all shipment packaging in its as-received condition. See Section 3.8. Photos are to be included as part of the end item data package (EIDP) where/when applicable. Supplier shall check if shock watch monitors attached to the shipping frames have been tripped upon arrival. If they are tripped, take photos of the monitors and notify SEAKR immediately for further instructions before proceeding.

Immediately, after removal from the original packaging, the desiccant and humidity indicator shall be stored in a sealed ESD bag for the duration of the coating process. This allows the original desiccant and humidity indicator to be re-used for return shipping. However, it is preferred that new desiccant be used for the return shipment if available. **NOTE: At no time should the desiccant and/or humidity indicator come in direct contact with the PCBA or attached mechanicals. These must be kept isolated from the PCBA per audited process.**

The shipping mechanical parts (if applicable) may be removed upon arrival, however it is preferred that the shipping frame remain attached until the PCBA is ready for processing. Refer to program specific SCD for the locations of the fasteners that are to be removed to release the PCBA from the frame. Handle and store mechanical parts with care so that surfaces do not incur damage or scratches during all processes.



After shipping fixture has been removed (where applicable), SEAKR provided nylon standoffs shall be installed in tooling holes at each outer corner of the assembly per handling best practice. Standoff locations may be adjusted or moved based on the specific PCB design for masking adherence and stability purposes. If standoffs interfere with masking adhesion or there is risk of leakage due to installed standoff locations, supplier may remove the standoffs at the supplier's discretion. Standoffs installed during supplier receiving inspection shall be photographed and provided to SEAKR in accordance with Section 3.8. Fixturing and/or temporary standoffs shall not touch populated areas at any point in the process unless approved by SEAKR.

3.5 Preparation

Assemblies shall be cleaned per agreed upon cleaning process at the supplier. A post handling inspection is recommended by the supplier at this step to ensure that no handling discrepancy has occurred within the receiving/cleaning process. Surfaces shall be primed per agreed upon priming process at the supplier. The use of other solvents or the use of other corrosive material is **NOT** permitted without prior written approval from SEAKR.

The supplier shall mask all fastener holes, connectors, and hatched areas in accordance with the program specific SCD. The use of ammoniated latex masking materials is prohibited unless approved by SEAKR Engineering. Assemblies shall undergo bakeout for a minimum duration of 60 minutes at 60°C +/- 5degC prior to coating. The actual duration and temperature used for bakeout are to be recorded in the Certificate of Conformance (CofC). Supplier shall bake any applicable processing coupons at the same time as the PCBA.

3.6 Coating Application

Coating shall be Parylene-C with UV tracer. Coating without UV tracer is permissible only with prior written approval from SEAKR Engineering. Coating shall target 0.00075 inches thick, while the range shall be 0.0005 to 0.0010 inches thick. Coating shall be applied to the following:

- PCBA(s)
- SEAKR PCB witness coupon (if available)
- Aluminum or glass test coupon

3.7 Post Processing

Supplier shall use EXTREME CARE when removing masking around components, and on or near surface traces or vias. Damage (including knife marks) to components, surfaces, traces, or vias is not acceptable. Contact SEAKR Engineering immediately upon identification of such damage or defects following de-masking.

Masking material shall be completely removed. Mechanical cleaning for the removal of excess coating is authorized, but locations shall be photo-documented and delivered as part of the end item data package. IPC-7711/7721 lists three methods of mechanical removal. Peeling, Grinding/Scraping, and Micro-Blasting. Supplier to use the method that has the least impact on the substrate. Supplier to contact SEAKR prior to performing any mechanical cleaning operation.



After the conformal coating process has been completed, the PCBAs shall be cleaned to remove any masking material, loose debris, or material that may damage or degrade coating performance.

Photos shall be labeled by PCBA part number and serial number and include “top” or “bottom” side of board descriptions, as well as general descriptions of quadrant locations. Alternatively, photos may be provided with redlined copies of drawings provided in the program specific SCD that detail locations of mechanical cleaning.

3.8 Pre and Post Coating Photos

Take detailed photos of the coated assemblies. Photos shall be included with the end item data package and labeled by board part number, serial number, and location (SEAKR can provide example photos of these views upon request):

- a) Normal view of connectors
- b) Top side of PCBA (Zoom in of parylene coated areas)
- c) Bottom side of PCBA (Zoom in of parylene coated areas if coated on bottom side)
- d) 4 photos (1 for each quadrant) of the top side of the PCBA
- e) 4 photos (1 for each quadrant) of the bottom side of the PCBA
- f) 1 photo of the top (and bottom, if applicable) of the PCBA under UV light to indicate coverage
- g) Locations of mechanical cleaning for the removal of excess coating
- h) Areas where potential damage may have occurred
- i) Photos of any shock watches attached to shipping frame when applicable.
- j) Photo of SEAKR provided standoffs installed on the assembly

4 QUALITY ASSURANCE PROVISIONS

Upon completion of all parylene coating processes, supplier shall perform 100% UV inspection and visual inspection to verify that all component solder leads and solder connections within the specified coating areas (see **program specific SCD**) are fully coated. Supplier shall also verify that coating thickness is 0.0005 to 0.0010 inches using the aluminum or glass test coupon. Items shall be inspected to MIL-I-46058.

Perform adhesion testing per ASTM D3359-09 Method B. All assemblies shall meet classification 3B or better. If a SEAKR-provided PCB coupon is available, that coupon shall be coated and used for adhesion testing. A supplier supplied coupon may be used in addition to the SEAKR PCB coupon, at supplier discretion. If no SEAKR PCB coupon is available, then adhesion testing must be performed on a supplier supplied coupon, and the supplier supplied coupon shall be returned to SEAKR with the deliverable hardware.

These products shall not contain the following prohibited materials: silicone, pure unalloyed tin, tin alloy containing more than 97% tin, or un-plated cadmium, zinc or brass.

All assemblies shall be visually inspected for quality per IPC-J-STD-001 and the space addendum (IPC-J-STDxS, where x is the latest revision) by the supplier prior to return shipment to SEAKR.



In addition, the **Supplier shall inspect for any handling or masking removal damage**: It is recommended that 10X be used for general inspection and 20X for any of the surrounding masked areas. PCBAs shall be free of cuts, nicks, or damage to solder mask that exposes underlying base metal, damaged components or solder resulting from the parylene coating process.

SEAKR must be notified whenever the parylene coating does not meet the drawing specification, or when non-conformances to the PCBA per IPC-J-STD-001 and the space addendum, or this specification, have resulted from the coating process. If the coating thickness is low, the Supplier may initiate and execute rework without SEAKR approval, as long as there is no additional masking/demasking required. However, SEAKR must be notified when this low thickness event occurs. All other repairs or reworks will require prior written approval from SEAKR before proceeding.

5 PREPARATION FOR DELIVERY

5.1 Required Photo-Documentation

Supplier shall take the following photos of the coated assemblies with mechanicals at a minimum throughout the re-packaging process and prior to shipment. All photos shall be included in the deliverable EIDP. Label photos with board part number and serial number.

- a) Normal view of connectors
- b) Top side of PCBA
- c) Bottom side of PCBA
- d) Photos of each quadrant, on the front and back side of the board
- e) Photo(s) that show PCBA in first ESD bag sealed. With desiccant bags and RH indicator outside of first ESD bag, then being inserted into second ESD bag.
- f) Photo of Shock Sensor

5.2 Package for Shipment

The supplier shall adhere to the procedure below for re-packaging of the assembly for return shipment to SEAKR:

- 1) If/when applicable, install SEAKR provided standoffs as received. Place the assembly on ESD foam or an ESD mat to prevent damage to connectors, pins, and components.
- 2) Install mechanical parts and/or protective items using the hardware called out in the program specific SCD, per the assembly drawing. Install fasteners hand tight.

Note: *Hand tight fastening is a qualitative torque that does not need to be measured. It falls in a range which is greater than the moderate torque that can be generated by using only fingers to grip the tool but less than 4in-lbs if measured using a torque tool.*

- 3) Verify any shock watches that are attached to the shipping frame are not tripped. If tripped, contact SEAKR engineering for further instructions before proceeding. Shock watch state shall be photo-documented per Section 3.8.
- 4) Bag assembly in single ESD bag and completely seal the bag
- 5) Place bagged assembly, desiccant, and humidity indicator in a second ESD bag. New desiccant is preferred; SEAKR supplied desiccant may be reused if it was stored in a

sealed bag throughout the PCBA coating process. **In no case shall the desiccant or humidity indicator be placed directly next to PCB.**

- 6) Carefully secure desiccant to the interior of the outer ESD bag with Kapton tape, in a position that cannot apply force to components and component leads on the PCBA.
- 7) Carefully secure humidity indicator to the interior of the outer ESD bag with Kapton tape. Use caution to not tape over humidity dots.
- 8) Completely seal the outer (second) bag.
- 9) Place double bagged and sealed assembly into SEAKR-supplied shipping box.
- 10) Package witness coupons separate from assemblies and return with coated assemblies. Ensure that the witness coupons are not shipped directly on top of or underneath the PCBA.
- 11) Place boxed assemblies into shipping container.

6 END ITEM DATA PACKAGE

The end item data package shall include, at a minimum: Certificate of Conformance (for each coating batch), including:

- Lot and date code for parylene / UV tracer if used
- List of PCBA serial numbers coated
- Actual time and temperature of bakeout
- Minimum, maximum, and average parylene thickness results
- UV inspection report
- Adhesion test results
- SEAKR Coated witness coupon (if applicable)
- Aluminum or glass witness coupon
- Labeled photos per section 3.7 and 3.8
 - Including photos under UV light
- As Received photos per section 3.4
- Return Shipment photos per 5.1