

## TAM PANEL



198055

### GENERAL DESCRIPTION

The Magnaflux® TAM Panel is one type of Known Defect Standard that can be used for the daily System Performance Check as specified in ASTM E1417 and AMS 2647. It is manufactured to UTC / Pratt & Whitney TAM 146040 Rev N and is provided with certification which includes indication sizes and an image of the processed panel. The TAM Panel is a tool for monitoring a penetrant system for sudden changes. It is not used to evaluate penetrant sensitivity.

The TAM Panel is constructed of 0.085-inch thick stainless steel, 4 inches by 6 inches. A strip of heavy chrome plating is deposited on one side of the panel. The plated area contains five evenly spaced “starburst” crack patterns, which are progressively smaller in size, progressing from the top. The sizes of the five starbursts are tightly controlled and factory certified to TAM 146040 specifications. The remaining front surface is grit-blasted to a uniformly roughened surface finish. This area is suitable for evaluating residual penetrant background characteristics.

No two panels have identical crack patterns. Chrome plating thickness variations and random residual plating stresses prevent exact duplication of manufactured panels.

### INSTRUCTIONS

The System Performance Check is a fast and reliable means of monitoring the proper function of a liquid penetrant inspection system. It is useful for water washable, post-emulsifiable, or post-removable processes, both fluorescent and visible. The purpose of the test is to verify that all steps of a penetrant processing system are functioning in the proper manner. If a penetrant processing system were to malfunction without being noticed, flawed critical parts could be passed and put into service. A significant shift in the system’s operating parameters or chemical conditions will result in decreased performance, which can be detected by using a standardized test panel with known defects. Regular checks using this Known Defect Standard would establish a time frame for the system failure or deficiency, and confine the number of parts which may require re-processing or re-examination.

To properly conduct a System Performance Check, the Known Defect Standard should be baselined. This

“calibrates” the test panel to the specific process and parameters used in the penetrant line. The test panel is processed with fresh and unused penetrant, emulsifier (if applicable), and developer according to the parameters used in the production line. The appearance of the test panel, the number of visible indications, and the quality of the indications are recorded. This process sets the baseline for that individual test panel. It is recommended that each penetrant system have its own baselined Known Defect Standard.

The daily System Performance Check involves running the test panel through the production penetrant system and examining the results. The appearance, number of indications, and quality of indications are compared to the baseline established for each test panel and each system. Any change should be investigated and corrected. It is recommended that each Known Defect Standard be “re-calibrated” or baselined at least once per year and after significant changes to the penetrant system.

The System Performance Check is meant to detect penetrant system changes in a short time frame. It is less effective in finding gradual changes in processing conditions, although, if test intervals were spaced too far apart, the change might appear to be sudden. Standard preventive maintenance should not be neglected. The System Performance Check is only one test required for proper operation of a penetrant line, and it does not replace scheduled examinations of penetrant materials, bath contamination, pressure gauges, nozzle orifices, etc.

For more information on the System Performance Check, use of Known Defect Standards, and maintenance tests for penetrant systems, please refer to ASTM E1417 Section 7.8 and SAE/AMS 2647 Section 4.

## **TAM PANEL PROCESSING TIPS**

- Follow the established processing procedure. Do not take shortcuts such as using a towel wipe rather than an oven dry.
- Allow for adequate developing time before evaluating the indications. For the most consistent results, evaluate promptly after developing.
- Always tilt the panel when viewing under ultraviolet light to minimize reflected light from the shiny chrome surface, otherwise, the smaller low brightness indications may be missed.
- Remove all post cleaning solvent from the cracked areas by oven drying before using panel. Residual solvent will impede and dilute penetrant materials.
- Clean the TAM Panel immediately after use. Do not allow penetrant materials to “set up” in the cracks.
- It is recommended to use separate test panels for each penetrant system.

## **TAM PANEL EVALUATION GUIDELINES**

- The ultra-sensitive penetrants, such as ZL-37 or ZL-56, should show all five cracks if the penetrant processing materials and systems are functioning correctly.
- The high sensitivity materials, such as ZL-27A and ZL-67, should show four cracks and, on occasion, the fifth.
- Medium sensitivity, such as ZL-2C and ZL-60D, should show the three largest cracks and occasionally the fourth. On occasion, a medium sensitivity penetrant will consistently show all five indications. This does not discredit the usefulness of the test panel. The important metric is a sudden change in appearance or failure to observe the expected number of indications.
- Low sensitivity penetrants, such as ZL-19, should show the two largest cracks and possibly the third.

## POSSIBLE CAUSES FOR SHIFT IN PROCESSING PERFORMANCE

- Improper pre-cleaning
- Penetrant contamination
- Emulsifier contamination
- Developer contamination
- Incorrect penetrant dwell time
- Incorrect hydrophilic emulsifier concentration
- Incorrect emulsifier dwell time
- Improper rinse pressure, temperature, spray pattern, or duration
- Improper drying oven time and temperature
- Incorrect concentration of aqueous or solvent developers
- Incorrect developing time
- Improper function of inspection light sources
- Improper inspection environment

## CLEANING PROCEDURES

### ALKALINE CLEANING PROCEDURE

1. Prepare an ultrasonic cleaning unit with 20% solution of MagnaVu® Alkaline Cleaner in DI Water.
2. Place the test panel face down (chrome plated side down) in basket. Clean panels for at least 10 minutes at  $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $140^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ).
3. Rinse the test panel for 90 seconds with a water spray at a pressure of 25 psi  $\pm$  5 psi, approximately 18" from the panels, and the water temperature at  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ).
4. Rinse the test panel with acetone.
5. Dry test panel in drying oven for 20 minutes at  $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $140^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ).
6. Check the test panel under UV light to verify adequate cleaning.
7. Store the clean test panel in its protective case.

### SOLVENT CLEANING PROCEDURE

1. Rinse the test panel to remove excess developer. Rinse for 30 seconds with a water spray at a pressure of 25 psi  $\pm$  5 psi, approximately 18" from the panels, and the water temperature at  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ).
2. Dry panels in drying oven for 20 minutes at  $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $140^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ).
3. Immerse the test panel in cleaning solvent such as isopropyl alcohol or acetone for 10 minutes. Remove the test panel and let air dry.
4. Check the test panel under UV light to verify adequate cleaning.
5. Store the clean test panel in its protective case.

For heavy-duty cleaning, use a lime residue removal product such as CLR. Immerse panels for 5 minutes in a 100% solution. Then proceed with the Alkaline Cleaning Procedure at Step 3.

**Note: The TAM Panel may be stored in acetone or isopropyl alcohol when not in use.**

## SPECIFICATIONS COMPLIANCE

Pratt & Whitney TAM #146040

ASTM E1417/E1417M-13 (Sections 7.8.3, 7.8.3.1 & 7.8.3.2)

AMS 2647D (Section 4.2)