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TRI-SERVICE PAVEMENTS WORKING GROUP (TSPWG) MANUAL

EVALUATION AND RESTORATION OF FOLDED FIBERGLASS MATS (FFM)

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EVALUATION AND RESTORATION OF FOLDED FIBERGLASS MATS (FFM)

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U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEER CENTER (Preparing Activity)

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	**Date**	**Location**

This TSPWG M supersedes Air Force ETL 07-10, *Evaluation and Restoration of Folded Fiberglass Mats (FFM)*, dated 19 December 2007.

FOREWORD

This Tri-Service Pavements Working Group (TSPWG) Manual supplements guidance found in other Unified Facilities Criteria, Unified Facilities Guide Specifications, Defense Logistics Agency Specifications, and Service-specific publications. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and, in some instances, Bilateral Infrastructure Agreements (BIA). Therefore, the acquisition team must ensure compliance with the most stringent of the TSPWG Manual, the SOFA, the HNFA, and the BIA, as applicable. This TSPWG Manual provides guidance for evaluating and restoring folded fiberglass mats (FFM). The information in this TSPWG Manual is referenced in technical publications found on the Whole Building Design Guide. It is not intended to take the place of Service-specific doctrine, Technical Orders (T.O.), field manuals, technical manuals, handbooks, Tactics, Techniques, and Procedures (TTP), or contract specifications, but should be used along with these to help ensure pavements meet mission requirements.

TSPWG Manuals are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction, maintenance, repair, or operations. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and the Air Force Civil Engineer Center (AFCEC) are responsible for administration of this document. Technical content of this TSPWG Manual is the responsibility of the Tri-Service Pavements Working Group (TSPWG). Defense agencies should contact the preparing activity for document interpretation. Send recommended changes with supporting rationale to the respective Service TSPWG member.

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- Whole Building Design Guide website: http://dod.wbdg.org/

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TRI-SERVICE PAVEMENTS WORKING GROUP (TSPWG) MANUAL

NEW SUMMARY SHEET

Document: TSPWG Manual 3-32-17.07-10, *Evaluation and Restoration of Folded Fiberglass Mats (FFM)*

Superseding: Air Force ETL 07-10, *Evaluation and Restoration of Folded Fiberglass Mats (FFM)*, dated 19 December 2007

Description: This Tri-Service Pavements Working Group (TSPWG) Manual provides guidance and a framework for the evaluation and restoration of folded fiberglass mats (FFM).

Reasons for Document: The purpose of this TSPWG Manual is to provide guidance for evaluating and restoring current FFM war reserve materiel (WRM). Specifications relating to newly manufactured FFM are still subject to Military Specification MIL-DTL-32265, *Folded Fiberglass Mat Fabrication and Packaging*.

Impact: The following benefits should be realized:

- Utilizing visual and nondestructive evaluation methods to determine the conditional assessment of FFM, stored as WRM in kits, ensures the FFM being employed is usable and in acceptable physical condition.
- These practices avoid unnecessary procurement of new FFM.
- Supplemental information on the operation, maintenance, and repair of pavements as well as airfield damage repair is available to all Services.
- Maintenance or upgrading of this supplemental information will include inputs from all Services.

Unification Issues: There are no unification issues.

Note: The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Department of Defense (DOD).

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CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

DOD flies and fights from its air bases; however, it is at the air base that air power is most vulnerable. After all, it is far more effective to destroy aircraft on the ground than to hunt them in the air. In future conflicts, one of the military engineer's primary wartime missions will likely be the repair of airfield pavement damage. Beginning in World War II, DOD recognized the vital need for airfields to support operations in all theaters of operation. Many times, this meant repairing enemy airfields or constructing new ones as quickly and close to the front as possible to provide this level of support. DOD is continuing research on rapid runway repair (RRR) methods. Folded fiberglass mats (FFM) currently function as the primary RRR and foreign object debris (FOD) cover employed for expedient bomb crater repairs in the event of runway damage.

1-2 PURPOSE AND SCOPE.

This Tri-Service Pavements Working Group (TSPWG) Manual provides guidance for evaluating and restoring current FFM war reserve materiel (WRM). Specifications relating to newly manufactured FFM are still subject to Military Specification MIL-DTL-32265, *Folded Fiberglass Mat Fabrication and Packaging*.

1-3 APPLICABILITY.

This TSPWG Manual applies to all DOD organizations responsible for the use and life-cycle management of FFM used in temporary airfield repair. The proper management of these stockpiles is essential to ensure all FFM being employed is usable and in acceptable physical condition; such practices will avoid unnecessary procurement of new FFM.

1-3.1 Intended Users.

- All pavement engineers and other units responsible for design, construction, maintenance, and repair of airfield pavements
- Air Force, U.S. Army Corps of Engineers (USACE), and Navy offices responsible for design, construction, maintenance, and repair of airfield pavements
- All designers and construction contractors building airfield pavements

1-4 GLOSSARY.

Appendix F contains acronyms, abbreviations, and terms.

1-5 REFERENCES.

Appendix G contains a list of references used in this document. The publication date of the code or standard is not included in this document. Unless otherwise specified, the most recent edition of the referenced publication applies.

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CHAPTER 2 FOLDED FIBERGLASS MATS

2-1 PREFACE.

FFM is stored as WRM in kits as described in MIL-DTL-32265. Due to the urgent, yet infrequent, nature of their use, monitoring the condition of such FFM stockpiles is vital to prepare for expedient repairs in the event of an attack. Currently, procedural methods directed toward evaluating the physical integrity of FFM are not specified, resulting in bases either developing their own individual methods and schedules or neglecting such condition-monitoring practices altogether due to lack of guidance. While the first aforementioned practice attempts to address operational issues, a uniform and rigorous evaluation plan is desirable. To develop such a plan, FFM samples have been studied to gain a better understanding of their bulk physical properties and responses to degrading environments. Results from this investigation are used to develop guidance to evaluate existing FFM and recommend qualified methods for repairing damage.

2-2 FFM EVALUATION METHODS.

2-2.1 General.

Two nondestructive evaluation methods are recommended for the conditional assessment of FFM held as WRM. The first method, referred to hereafter as a “Level I Evaluation,” is based on the systematic visual detection of critical damage. Critical damage criteria are outlined to assist personnel in the evaluation process; however, the final decision to accept or reject any FFM will still be based on human judgment.

The second proposed method, a “Level II Evaluation,” enables FFM to be further evaluated using tools that attempt to decrease the amount of relative subjectivity intrinsic to human judgment. This method requires the use of an ultrasonic wheel probe. By taking signal measurements at damaged FFM locations with an ultrasonic wheel probe, the evaluator is able to base their acceptance decision on quantitative data.

Record the location and extent of damage on an evaluation sheet (see Appendix C). Appendix D contains an example of a statement of work for the inspection of FFM.

2-2.2 Level I Evaluation: Visual Inspection.

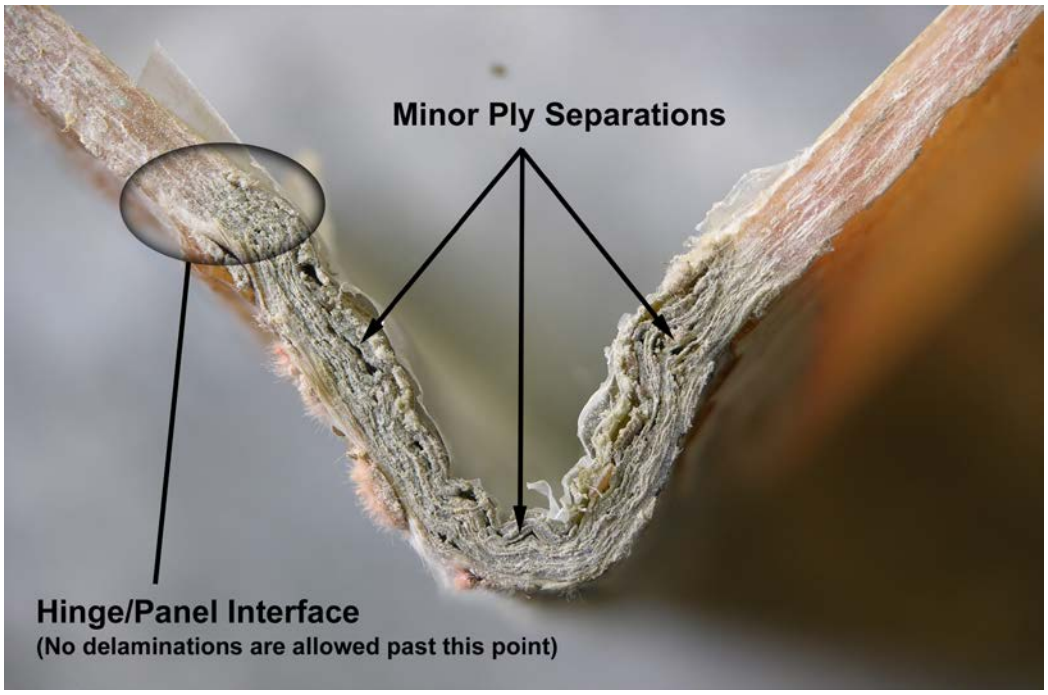
2-2.2.1 FFM Preparation.

Before being inspected, thoroughly clean FFM with pressurized water or scrub on both sides to ensure there are no areas that may cause false categorization of damage. In particular, heavy soil spots or stains may appear to look like impact damage or delaminations. After cleaning, dry the mat, unfold, and orient so the smooth resin side (FFM bottom side) is facing up. This is the recommended FFM position during evaluation because it is easier to discern damage against a smooth background. Inspect FFM during the evaluation process for critical damage as explained in the following paragraphs.

2-2.2.2 Delaminations (Ply Separations).

During inspection, examine FFM for the presence of ply separations, commonly called delaminations. It may be difficult to discern between internal dry spots and delaminations at times, so examine such damage closely. Delaminations, if present, propagate very quickly under large flexural loads, leading to FFM failure. For this reason, it is recommended that no delaminations be present on rigid panel sections of FFM used in airfield repair. The most common location for delaminations to form is throughout the hinge–panel interface area. An occurrence of such a delamination is shown in Figure 2-1. Delaminations in this area are not of significant concern unless they extend out into the FFM rigid panel area.

Figure 2-1 Minor Delaminations in Elastomer Hinge



2-2.2.3 Dry Spots.

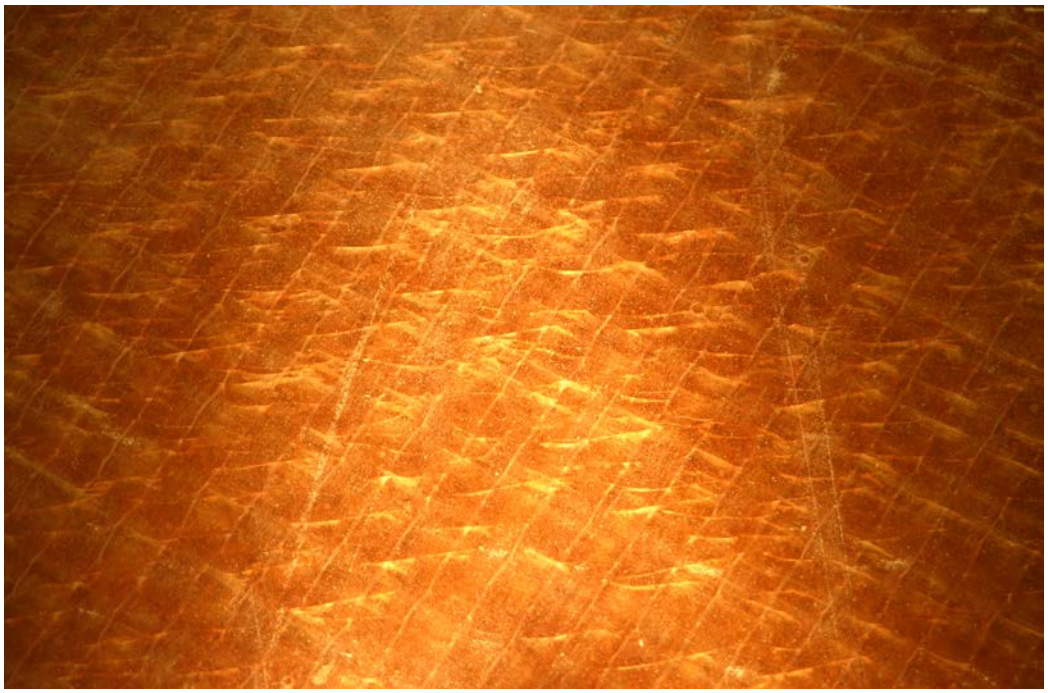
During the manufacturing process, some small areas of mat may not be properly wetted with resin, creating a “dry spot.” Since this is a manufacturing defect, most occurrences of dry spots are addressed during the initial compliance inspection. If dry spots are found during FFM evaluations, ensure they are held to the compliance specifications as listed in MIL-DTL-32265. None are tolerable in excess of 0.5 inch (in.) (13 millimeters [mm]) in diameter. Ensure there are less than 10 occurrences in any 1-square-foot (ft^2) (0.09-square-meter [m^2]) area of the mat. If these criteria are not met, clean the dry spot and rewet with resin to restore FFM to a serviceable condition.

2-2.2.4 Directional Cracks.

Two significantly different types of cracking have been observed on rigid panel sections of FFM. The less severe is a unidirectional cracking commonly created by large flexural

loads. All cracks appear to be near the surface and do not penetrate into the fiberglass reinforcement, thus keeping fiber-matrix interfacial bonds intact. When this type of damage is discovered, carefully examine the depth of such cracks and verify they have not propagated into the fiberglass reinforcement area. One practical method of examining crack depths requires a directional light source such as a focused flashlight beam or sunlight. When the light source is pointed at an angle to the FFM surface, cracks will reflect light at a different angle than light refracting off the FFM surface. This makes the cracks stand out by either making them lighter or darker than the surface, depending on where the observer is located, as seen in Figure 2-2. Essentially, the light source is one method of increasing the visual contrast between cracks and the rest of the mat. Upon inspection, if the directional cracking is localized to the resin surface, the rigid panel is deemed acceptable. If cracks have propagated into the fiberglass reinforcement, replace or patch the rigid panel as its strength has likely deteriorated to an unacceptable level.

Figure 2-2 Unidirectional Cracking Seen with Angled Flashlight



2-2.2.5 Randomly Oriented Surface Cracks.

The second type of cracking occurs in random patterns displaying connectivity and is called “map” or “alligator” cracking. This damage is shown in Figures 2-3 and 2-4. Although not common, this cracking has been determined in multiple tests to be more serious than unidirectional cracking. The severity of damage is a function of crack connectivity, which creates a “network” of weak sections bonded onto fiberglass. During the FFM evaluation process, it is important that inspectors are meticulous to locate this type of surface cracking as it is not an obviously apparent type of damage. In trial inspections, this type of cracking has been observed to occur over large sections of rigid

panels. Under such circumstances, it is important that whole panel sections are replaced due to the likelihood of crack propagation under load.

Figure 2-3 Randomly Oriented Surface Cracking Visualized with Image Processing

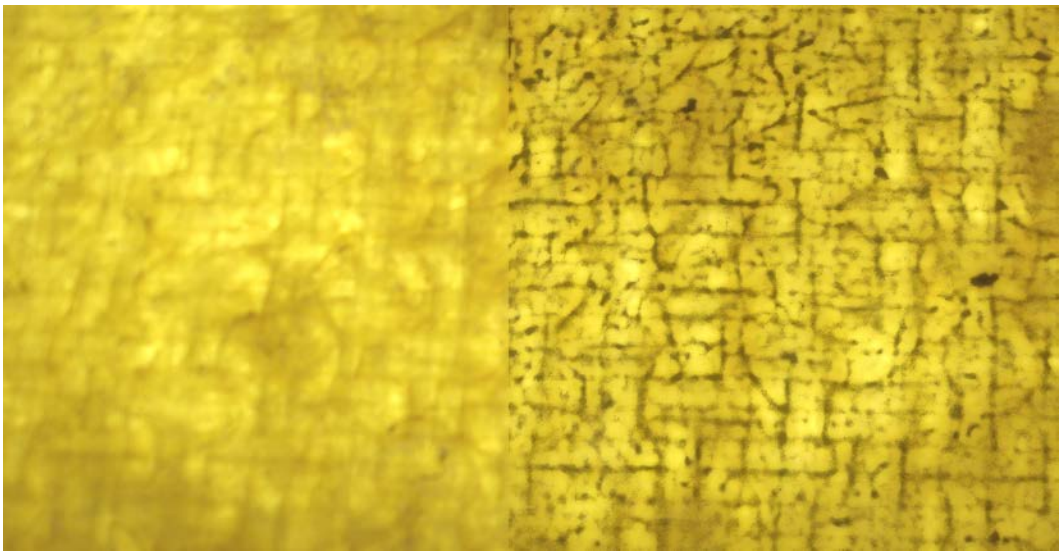
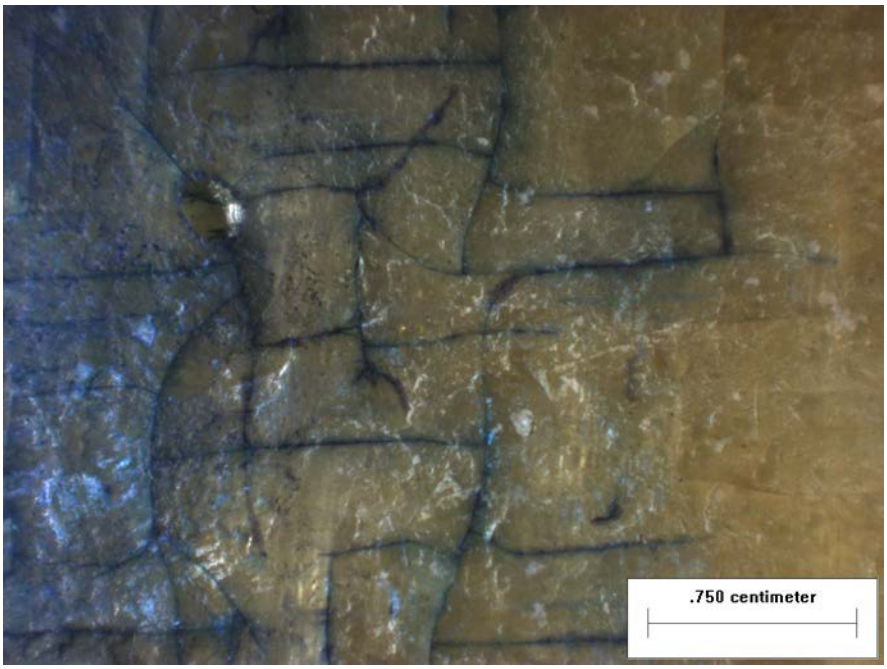


Figure 2-4 Randomly Oriented Surface Cracking with Methyl Blue Dye



2-2.2.6 Tears.

Hinges that have experienced significant tensile loads begin to exhibit failure in the form of tears or broken fiberglass. In some cases, mats that have only been exposed to storage environments have also exhibited this type of damage, as seen in Figure 2-5. These cases are caused by elastomer shrinkage, folding strains, ultraviolet radiation

damage, or thermal stresses. Any hinge areas that are torn, regardless of tear length, are not suitable for use. Replace such hinges as allowed by approved repair methods. Some FFM manufacturers have attempted to address the occurrence of hinge tears by controlling the location of bending, high-stress concentration areas in new elastomer hinges as seen in Figure 2-6. Such procedures decrease the occurrences of tears and delaminations near hinges.

Figure 2-5 Critical Damage to FFM Hinges

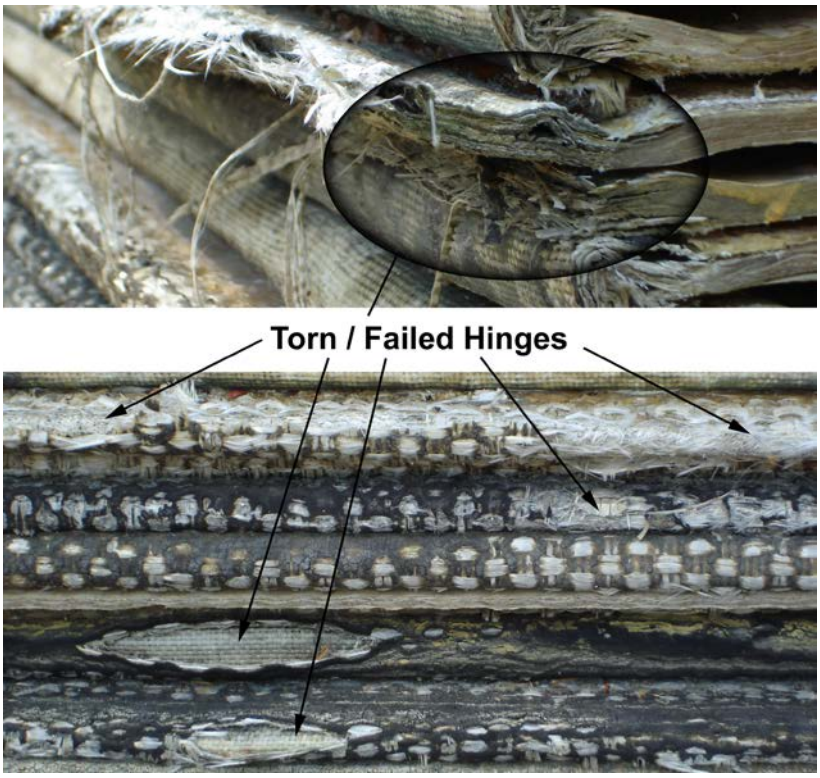


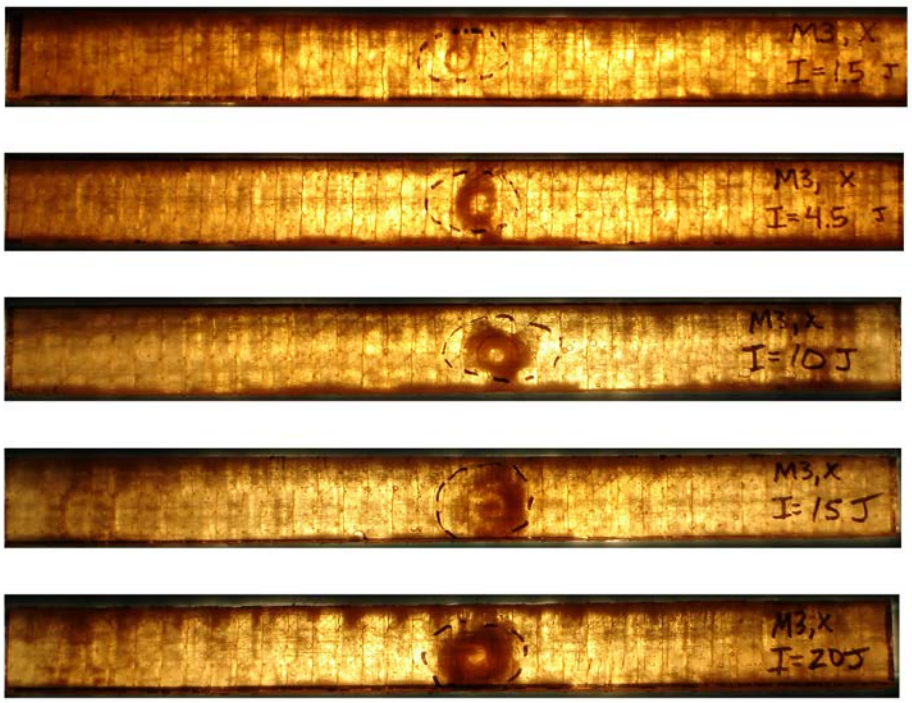
Figure 2-6 Alternate Hinge Fabrication

2-2.2.7 Localized Impact.

During FFM use, it is likely that impact damage will occur from FOD or aggregate underneath the FFM. Under most circumstances, impact damage affects FFM strength in negligible amounts because it is localized to small areas. However, when impact damage is measured to be 1 in. (25 mm) or more in diameter, it is a concern in the evaluation process. Ensure locations of impact areas this size do not occur in a

frequency greater than five per 1 ft^2 (0.09 m^2). Also, any occurrences greater than 4 in. (100 mm) in diameter are not allowed. Reject panel sections due to impact damage that have less than five locations per 1 ft^2 (0.09 m^2) due to crack propagation. If cracks run outside of the impact (discolored) area, examine as described in paragraph 2-2.2.4. Cracks deep enough to penetrate into the fiberglass reinforcement area are a cause for panel rejection. Such areas are marked using a permanent marker for further evaluation in the repair process. Panel replacement may not be necessary when damaged areas are cut out and patched. Figure 2-7 shows examples of impact damage at varying intensities.

Figure 2-7 Localized Impact Damage Visualized with Backlighting



2-2.2.8 Unclassified Damage.

There will undoubtedly be types of damage found during FFM evaluations that have not been covered in this TSPWG Manual or seem to blur the lines of classification. The significance of such damage will require the judgment of an evaluator. An example of questionable damage is shown in Figure 2-8. Either caused by a dry spot or impact damage, this damaged area has worsened to the point where reinforcing fibers have failed. If larger than 1 in. (25 mm) in diameter, such areas are cut out and replaced as specified by acceptable repair methods. When dealing with unclassified damage, an evaluator uses their best judgment, keeping in mind the relative severity of previously described damage.

Figure 2-8 Examples of Unclassified Damage

2-2.3 Level II Evaluation.

2-2.3.1 FFM Preparation.

Before inspection, FFM will be prepared as described in paragraph 2-2.2.1. After completing the Level I Evaluation and the damage is located and recorded on an evaluation sheet (see Appendix C), use an ultrasonic wheel probe by a trained operator to further evaluate the severity of the internal FFM damage.

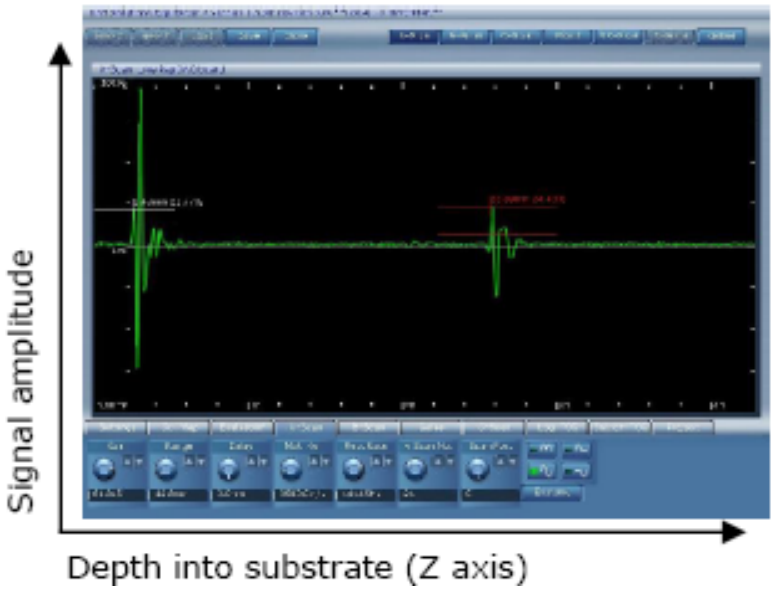
2-2.3.2 Use of Wheel Probe.

In the Level II Evaluation, visual inspection still functions as the method for initially locating damage. Test an undamaged section of the same FFM as a control for comparative purposes. Use signal amplitude and attenuation data from the wheel probe system, coupled with acceptance criteria from a Level I Evaluation, to make an overall judgment on each panel's condition. Ensure the ultrasonic wheel probe employs a wheel probe sensor operating between 2 to 5 megahertz (MHz) for signal clarity. Evenly apply a light film of water to the surface of the smooth side (bottom side) of the FFM panel to serve as a coupling agent for the sensor. Roll the wheel probe across the damaged section at a rate of approximately 8 in. (200 mm) per second. A signal gain of at least 30 decibels (dB) is required to amplify the test results for analysis. The scanner's software produces three plots for analysis: A-scan, B-scan, and C-scan.

2-2.3.2.1 A-Scan.

The A-scan is sound echo response from a single position, as shown in Figure 2-9. The scan typically shows two amplitude peaks at the surface and bottom of the mat. Any defect inside the mat will reflect the ultrasonic energy before it reaches the bottom of the panel, resulting in an additional peak between the surface and bottom peaks.

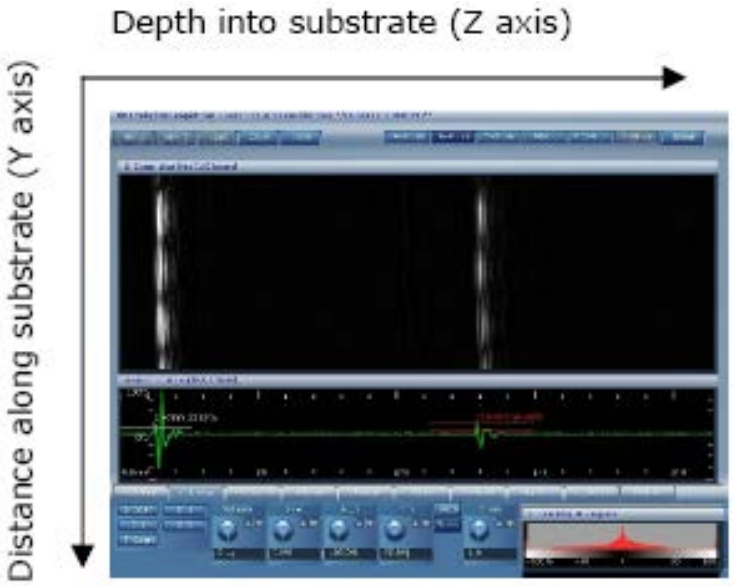
Figure 2-9 Example of A-Scan Plot Showing Surface and Bottom of FFM



2-2.3.2.2 B-Scan.

The B-scan is produced when a number of A-scans are performed along a linear length, for example by rolling the sensor across the mat surface in a straight line. An example of a B-scan is shown in Figure 2-10.

Figure 2-10 Example of B-Scan Plot Showing Results for One Roll-Width Scan



2-2.3.2.3 C-Scan.

The C-scan uses a color scale to represent the amplitude of the data, thereby producing a pictorial representation of any change in the internal structure of the FFM. An example of a C-scan of an undamaged panel is shown in Figure 2-11. An example of an FFM panel with significant impact damage is shown in Figure 2-12. The software permits the user to reformat the C-scan to select a binary color scale to sharply contrast damaged versus undamaged areas, as shown in Figure 2-13.

Figure 2-11 Example of C-Scan Plot Showing Results for Undamaged FFM

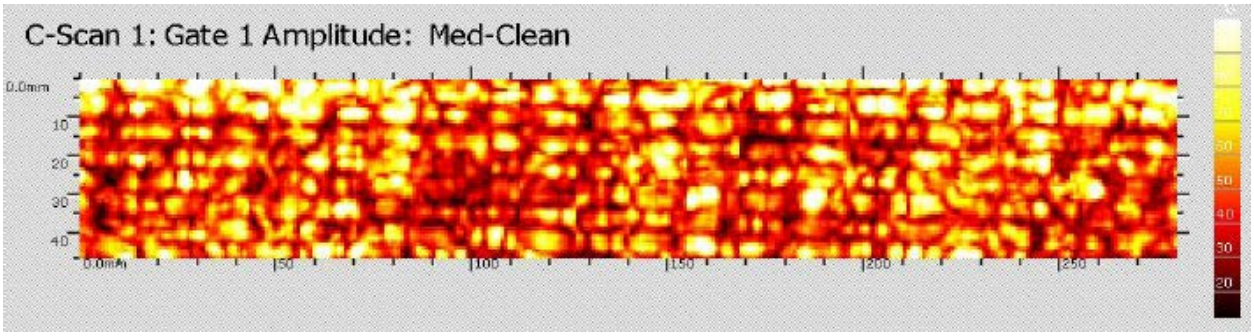


Figure 2-12 Example of C-Scan Plot Showing Localized Impact Damage

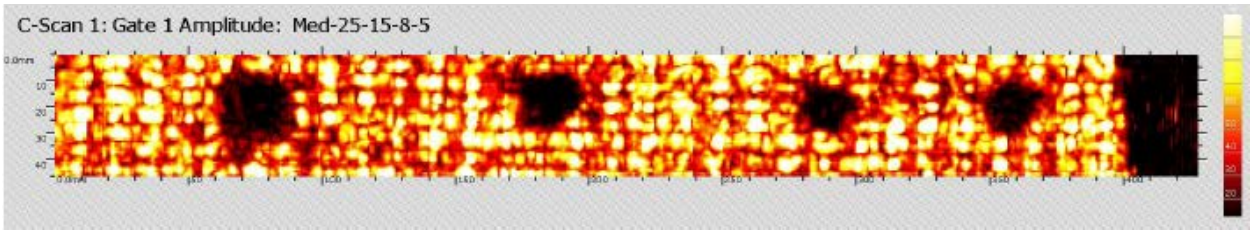
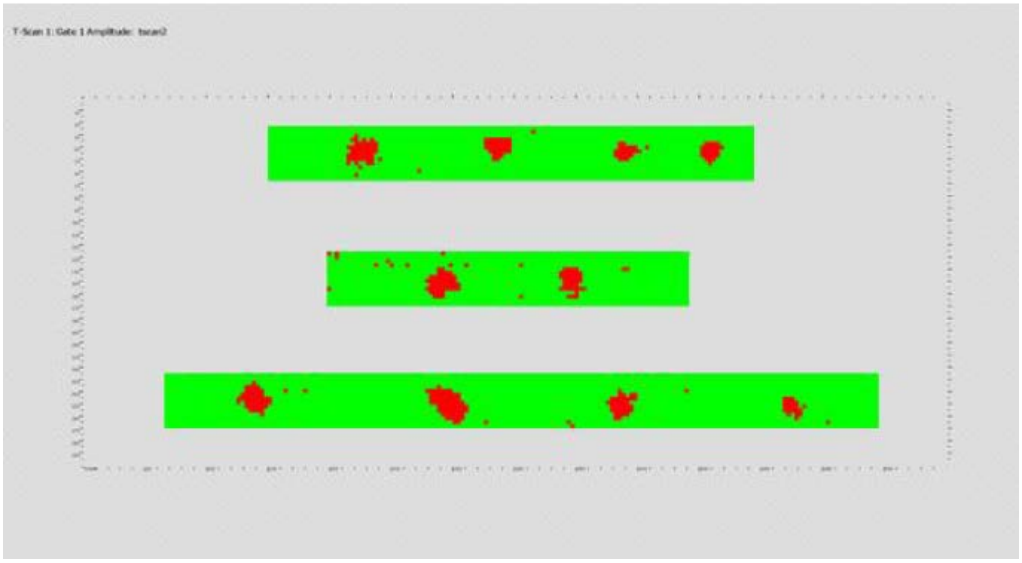


Figure 2-13 Example of C-Scan Plot Showing Pass-Fail Results Using Binary Colors



2-2.3.3 Analysis of Level II Results.

The ultrasonic test results are used in conjunction with the acceptance criteria from the Level I Evaluation to make an overall judgment on each panel's condition. Table 2-1 shows the types of damage, acceptance criteria, and guidance for severity Level II analysis. The evaluator will be required to judge the damage severity from the images provided by the ultrasonic equipment. The ultrasonic sensor is meant to serve as a tool to assist in detecting the extent of damage to the panels, particularly where the damage severity is difficult to discern using a Level I Evaluation.

Table 2-1 Level II Mat Damage Assessment

Damage	Criteria	Level II Guidance
Delamination/ply separation	No delaminations are allowed in the rigid panel; however, some delamination is allowed in the hinge itself. See para. 2-2.2.2 and Figure 2-1.	Delamination will appear as interconnected damaged zones in the C-scan.
Dry spots	None in excess of 0.5 in. (13 mm) in diameter and less than 10 occurrences in any 1-square-foot (ft^2) (0.09-square-meter [m^2]) area of the mat.	Dry spots appear as isolated damaged zones in the C-scan, slightly larger than the visual evidence. Interconnected damaged areas indicate more severe damage.
Directional cracking	Acceptable only if limited to the resin.	Cracks appear as interconnected discolored lines in the C-scan. The darker the discoloration and more interconnectivity, the worse the damage.
Random cracking	Generally not acceptable unless confined to a localized area and do not extend through the resin.	Cracks appear as evenly dispersed, interconnected discolored lines in the C-scan. The darker the discoloration and more interconnectivity, the worse the damage.
Tears	None acceptable.	Level II Evaluation unnecessary.
Localized impact	No more than five 1-in. (25-mm) (or greater) -diameter occurrences per square foot (0.09 m^2). No impact areas in excess of 4 in. (100 mm) in diameter are permitted.	Impact areas appear as defined concentric discolorations in the C-scan as shown in Figure 2-12. Localized impact damage that indicates connections to adjacent damaged areas are more severe.
Unclassified damage	Use judgment with above criteria.	Damage appears as discolored sections. The size of discolored areas and interconnectivity between areas shown on the C-scan can assist in determining the severity of the damage.

2-3 FFM REPAIR.

2-3.1 Certification of Vendors to Complete Repairs.

There are currently three principal repairs: hinge replacement, panel replacement, and panel patching. It is recommended that these repairs be accomplished by vendors certified to complete these repairs. Each type of repair requires a separate certification; therefore, a vendor may be certified to perform one repair but not another. Appendix B contains a list of manufacturers certified at the time of the preparation of this TSPWG Manual to perform repairs, which repairs they are certified to perform, and contact information for each vendor. An updated list of certified vendors is available upon request from the certification officials listed in paragraph 2-3.1.1.

Appendix E contains an example of a statement of work for the restoration of FFM.

2-3.1.1 Vendor Certification Officials

Vendor certifications for each repair are issued by either of the following certification officials:

- Pavements Discipline Working Group (DWG) or designated representative
- Chief of the Airfields and Pavements Branch, Geotechnical and Structures Laboratory
  U.S. Army Engineer Research and Development Center, ERDC/GSL
  3909 Halls Ferry Road
  Vicksburg MS, 39180

2-3.1.2 Vendor Certifications.

Vendors can obtain certification by demonstrating to the certification official their ability to meet the required material properties of MIL-DTL-32265 and this TSPWG Manual. Perform all physical, chemical, and mechanical property testing by an independent laboratory accredited to perform the required ASTM tests. Ensure the vendor is accredited by the American Association for Laboratory Accreditation (A2LA) in accordance with the requirements of ASTM E329, *Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection*. The certifying agency has the right to review and confirm all documentation and lab procedures associated with this accreditation before issuing the certification.

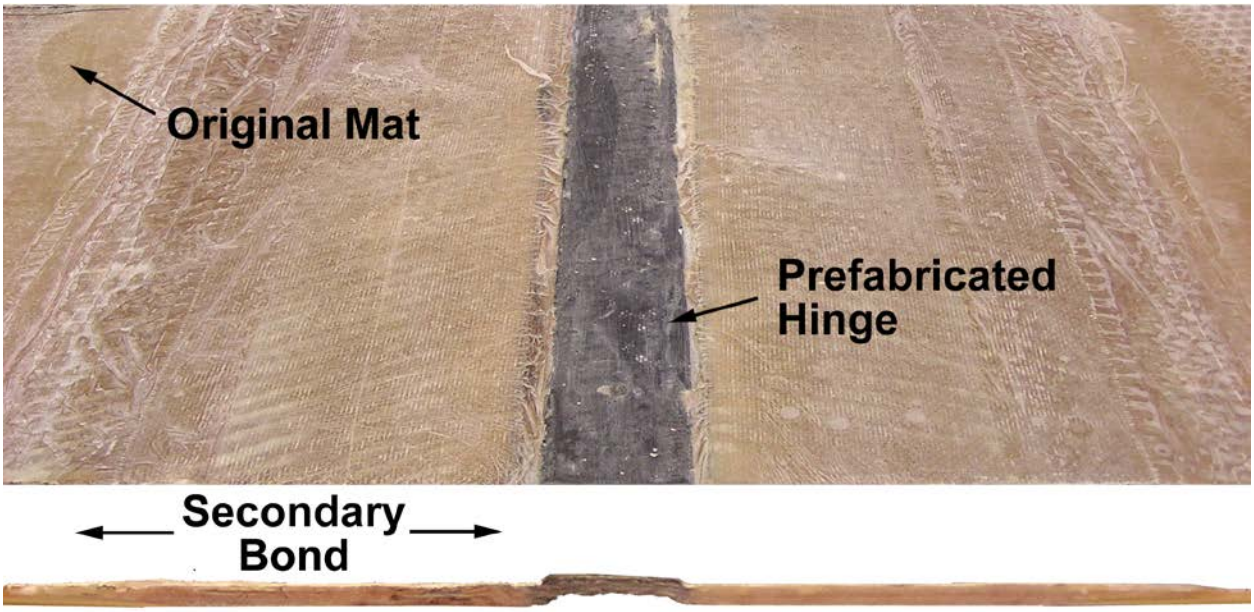
2-3.2 FFM Acceptance Documentation.

After each evaluation, FFM will either be accepted or rejected based on physical condition. It is important that all rejected FFM have documentation as to why they were rejected so the proper repair protocol can be followed. A recommended evaluation sheet is provided in Appendix C for review and use. Submit other manufacturers and methods of FFM repair to the certification officials listed in paragraph 2-3.1.1 for incorporation into Appendix B as evidence of their ability to meet the required specifications.

2-3.3 Hinge Replacement.

One method of FFM hinge replacement has been tested to verify the repair meets minimum engineering property standards defined in this TSPWG Manual. This method involves removing the damaged hinge, panel surface preparation, and the secondary bonding of a prefabricated hinge. Figure 2-14 shows a photo of the approved hinge replacement repair. Ensure the hinge replacement repair includes a minimum 7.1-in. (180-mm) -wide secondary bond to meet the minimum strength material properties of MIL-DTL-32265 and this TSPWG Manual. Repairs with secondary bonds less than 7.1-in. (180-mm) -wide fail to meet the minimum strength requirements and are not acceptable.

Figure 2-14 Plan View and Cross-Section of Hinge Repair



2-3.4 Panel Replacement.

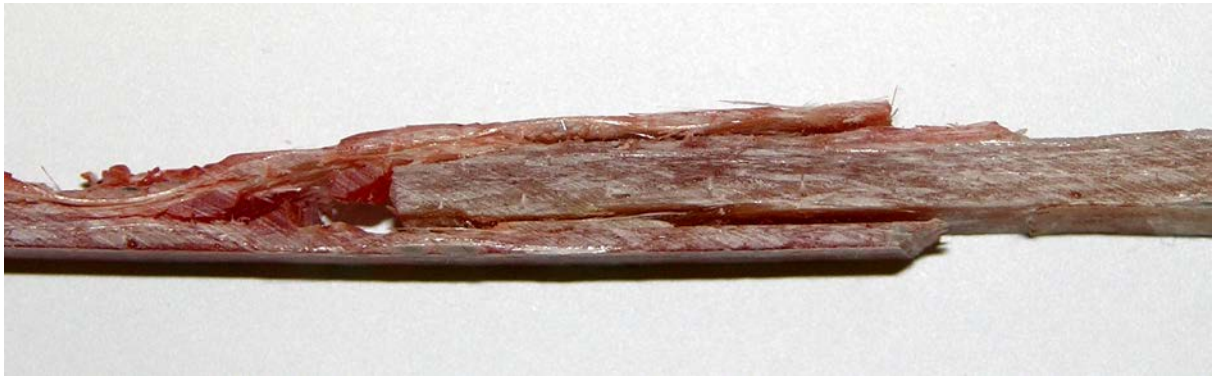
When an FFM rigid panel needs replacement, it is possible to place a new panel by performing two hinge replacement operations (as described in paragraph 2-3.3) on both sides of the new panel. If the newly manufactured panel meets initial compliance specifications and the hinge replacements meet repair standards, the repair is considered acceptable.

2-3.5 Panel Patches.

When small areas of damage are found, it is possible to repair them with a patch instead of replacing the entire rigid panel. The damaged section is cut out, prepared, and a secondary bond made between the patch and existing panel. Ensure the patch is physically equivalent to the panel in material composition, including the type of resin used as the secondary bonding agent, and testing was completed to determine an optimal secondary bond size for patches in the rigid panel area. It has been determined that a secondary bond width of 3.5 in. (90 mm) is sufficient relative to the required

specifications. This means that all new patches applied to FFM must overlap the existing mat by 3.5 in. (90 mm) on the top and bottom surfaces. At this size, the bond strength exceeds that of a mat's tensile strength. The cross-section of a failed test specimen with a secondary bond is shown in Figure 2-15 for reference.

Figure 2-15 Cross-Section of Failed Secondary Bond Test Specimen



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APPENDIX A BEST PRACTICES

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APPENDIX B CERTIFIED REPAIR VENDORS AND MANUFACTURERS CONTACT INFORMATION

B-1 CERTIFIED REPAIR VENDORS.

Hinge replacement:

Ready Mat US, LLC (See paragraph B-2 for contact information.)

Panel replacement:

Ready Mat US, LLC (See paragraph B-2 for contact information.)

Panel patching:

Ready Mat US, LLC (See paragraph B-2 for contact information.)

Rapid Runway Repair, Inc. (See paragraph B-2 for contact information.)

B-2 FFM MANUFACTURERS.

Ready Mat US LLC
PO 231
Sulphur, LA 70664 USA
Telephone: (337) 274-7817
www.readymatus.com

Rapid Runway Repair, Inc.
245 Illinois Street, Building 7
Delhi, Louisiana 78734 USA
Telephone: (714) 270-6467
www.rapidrunwayrepair.com

AMS Industries LLC
1813 Associates Lane, Suite A
Charlotte, NC 28217
Telephone: (704) 376-8500
www.ams-ind.com

B-3 ULTRASONIC WHEEL PROBE MANUFACTURER.

The ultrasonic sensor and software recommended for a Level II Evaluation can be obtained from NDT Solutions. Actual costs depend upon quantity and market conditions. Alternative sources may be available.

NDT Solutions
10-1 Airport Road
New Richmond, WI 54017 USA
Telephone: (715) 246-0433
www.ndts.com/

APPENDIX C FFM EVALUATION SHEET

Mat Identification #: _____

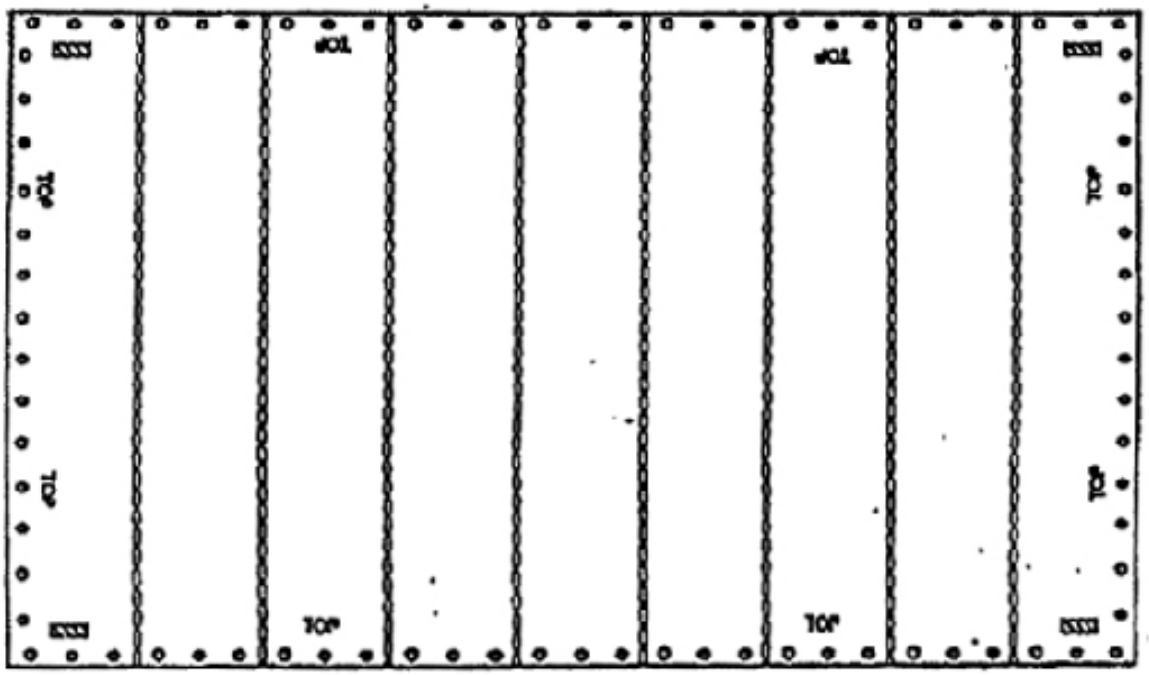
Date: _____

Inspected By: _____

Damage Listing:

- DL – *Delamination* – None allowed in rigid panel
- DS – *Dry spot* – Less than 0.5 in. (13 mm) diameter acceptable if less than10 occurrences in 1 ft^2 (0.09 m^2)
- DC – *Directional cracks* – Acceptable if cracks have not propagated into fiberglass reinforcement
- HT – *Hinge tears* – None allowed
- LI – *Localized impact* – Less than 4 in. (100 mm) diameter acceptable if less than 5 occurrences in 1 ft^2 (0.09 m^2)
- UD – *Unclassified damage* – Evaluator judgment
- RC – *Randomly oriented surface cracks* – No areas allowed unless localized.

Circle Areas of Damage and Label Appropriately



Accept / Reject

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APPENDIX D EXAMPLE STATEMENT OF WORK: INSPECTION OF FFM

Description: The _____(organization)_____ is tasked with maintaining readiness to support the rapid repair of damaged airfield pavements. Folded fiberglass mat (FFM) is a critical enabling technology in supporting this mission, and the condition of FFM materials must be monitored to ensure the material will perform should its deployment become necessary. The _____(organization)_____ currently has a stockpile consisting of _____ mats stored indoors/outdoors. The required technical support required under this contract consists of inspecting the condition of the entire inventory of FFM mats, including all kit components, and reporting the condition of the mats in accordance with TSPWG MANUAL 3-32-17.07-10 (attached), along with recommendations for refurbishment, disposal, and replacement. The specific tasks required include, but are not limited to:

1. Locating and identifying by manufacture lot all FFM kits currently in inventory.
2. Visually inspecting all FFM kits in inventory according to the Level I inspection process in TSPWG MANUAL 3-32-17.07-10.
3. Visually inspecting FFM kit components, including anchor bushings, connector bushings, joining panels, concrete anchor bolts, and asphalt anchor materials.
4. Nondestructively testing a minimum of 10 percent of the entire inventory according to the Level II inspection process in TSPWG MANUAL 3-32-17.07-10.
5. Performing destructive tests on samples removed from 10 percent of the mats identified in the inspection that are in questionable condition to determine if the mats meet the minimum engineering properties described in TSPWG MANUAL 3-32-17.07-10. The engineering physical property tests must be conducted in accordance with the ASTM procedures described in MIL-DTL-32265.
6. Documenting the results of the visual inspection, nondestructive testing, and any destructive testing in a final report within (1) month of the date of inspection.
7. Providing recommendations regarding the disposal or refurbishment of mats failing to meet the minimum standards, as well as recommendations for procurement of replacement mats and kits.

Government Estimate: The government estimate for completing this scope of work is notional. Validate with local service providers prior to procurement:

CONUS: Travel Expenses: $3,600.00

Inspection Labor: $480/kit (Command provides forklifts and operators)

Destructive Testing: $9,000.00

Reporting: $3,000.00

Overhead Costs: $4,800.00

Total Estimate for 20 Kits: $30,000.00

OCONUS: Travel Expenses: $8,400.00

Inspection Labor: $720/kit (Command provides forklifts and operators)

Destructive Testing: $12,000.00

Reporting: $3,000.00

Overhead Costs: $9,000.00

Total Estimate for 20 Kits: $46,800.00

APPENDIX E EXAMPLE STATEMENT OF WORK: RESTORATION OF FFM

Description: The _____(organization)_____ is tasked with maintaining readiness to support the rapid repair of damaged airfield pavements. Folded fiberglass mat (FFM) is a critical enabling technology in supporting this mission and the condition of FFM materials must be monitored to ensure the material will perform should its deployment become necessary. A recent inspection of the ___(organization)_____ FFM kit inventory revealed that _____ FFM panels were in need of refurbishment or repair. The required technical support required under this contract consists of repairing the substandard mats according to procedures described in TSPWG Manual 3-32-17.07-10 (attached). The type and number of repairs required are as follows:

1. Hinge replacement _____ hinge(s)
2. Panel replacement: _____ panel(s)
3. Panel patches _____ patch(es) Approximate area: _____ square feet

Proposal Preparation: The proposal should include the cost for pickup of the damaged panels and delivery of the repaired panels if the panels will not be repaired at the government facility. The proposal should include an itemized cost for performing each type and number of repairs. Each repaired panel should be stenciled in permanent white lettering (minimum letter height 2 in. (50.8 mm) with the word “REFURBISHED – MM/YY – Vendor Name” in the center of the panel approximately 6 in. (152 mm) from each edge of the panel. The government reserves the right to randomly sample repaired panels to verify the repairs meet minimum engineering property requirements defined in MIl-DTL-32265. The government reserves the right to reject all repairs failing to meet the minimum published standards. All repairs must be completed and the panels returned to the _____(organization)_____ within (2) months of pickup. A letter documenting the date, vendor, and QA procedures must accompany each repaired panel.

Government Estimate: The government estimate for completing this scope of work is notional. Validate with local service providers prior to procurement:

CONUS: Shipping/Travel Expenses: $3,000.00/mat

Hinge Replacement: $2,400/hinge

Panel Replacement: $5,400/panel

Panel Patching: $100/square foot

Reporting/Stenciling: $1,800.00

Overhead Costs: $2,400.00

OCONUS: Shipping/Travel Expenses: $8,400.00

Inspection Labor: $720/kit (Command provides forklifts and operators)

Hinge Replacement: $3,600/hinge

Panel Replacement: $6,600/panel

Panel Patching: $180/square foot

Reporting/Stenciling: $2,400.00

Overhead Costs: $3,600.00

APPENDIX F GLOSSARY

F-1 ACRONYMS

ASTM	American Society for Testing and Materials
CONUS	Continental United States
DOD	Department of Defense
DWG	Design Working Group
FFM	Folded Fiberglass Mat
FOD	Foreign Object Damage
ft^2	Square Foot
in.	Inch
m^2	Square Meter
mm	Millimeter
OCONUS	Outside Continental United States
QA	Quality Assurance
TSPWG	Tri-Service Pavement Working Group
WRM	War Reserve Materiel

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APPENDIX G REFERENCES

DOD

MIL-DTL-32265, *Folded Fiberglass Mat Fabrication and Packaging*, http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=275880

ASTM INTERNATIONAL

ASTM E329, *Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection*, http://www.astm.org