NAVSEA
STANDARD ITEM

FY-26

ITEM NO: 009-124
DATE: 12 MAR 2024
CATEGORY: II

1. SCOPE:

1.1 Title: Thermal Spray Nonskid Application; accomplish

2. REFERENCES:

2.1 Standard Items

2.2 T9074-AA-GIB-010/1687, Thermal Spray Processes for Naval Ship Machinery and Nonskid Applications

2.3 Association for Materials Protection and Performance (AMPP) Standards, Including Legacy NACE and SSPC Standards

2.4 ASTM F21, Standard Test Method for Hydrophobic Surface Films by the Atomizer Test

2.5 229 CFR 1915, Occupational Safety and Health Standards for Shipyard Employment, Subparts C and Z

2.6 ANSI/NACE SP0508, Methods of Validating Equivalence to ISO 8502-9 on Measurement of the Levels of Soluble Salts

2.7 ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air

2.8 ASME B46.1, Surface Texture (Surface Roughness, Waviness and Lay)

2.9 ASTM D4417, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

2.10 ASTM D7127, Standard Test Method for Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument

2.11 ISO 8502-3, Preparation of steel substrates before application of paints and related products — Tests for assessment of surface cleanliness — Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)

2.12 ASTM D522, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

2.13 A-A-59316, Commercial Item Description: Abrasive Materials; for Blasting

3. REQUIREMENTS:

3.1 Consider marine coatings, nonskid and abrasive blasting media to contain heavy metals (e.g., beryllium, cadmium, chromium, and lead), hexavalent chromium, crystalline silica, and/or other toxic or hazardous substances.

3.2 Maintain the following certifications for accomplishing thermal spray nonskid (TSN) operations. Information for these certifications can be found at www.ampp.org/certification.

3.2.1 Organizations accomplishing thermal spray nonskid application must be certified in accordance with 2.2.

3.2.2 Thermal spray application personnel and the applicable procedure must be qualified as defined in 2.2.

3.2.3 Organizations accomplishing blasting operations (abrasive and waterjetting) and color topping application must be certified in accordance with 009-32 of 2.1.

3.2.4 Personnel accomplishing abrasive blasting, ultra high pressure waterjetting (UHP WJ), high pressure waterjetting (HP WJ), or preservation must be certified in accordance with 009-32 of 2.1.

3.2.5 Personnel qualifications for low pressure water cleaning (LPWC) operations are as follows:

3.2.5.1 The contractor conducting LP WC operations to NACE/SSPC-SP WJ-4 on nonskid decks must be certified in accordance with SSPC-QP 1 of 2.3 or a NAVSEA-approved equivalent.

3.2.5.2 The onsite foreman for thermal spray nonskid application must be certified in accordance with NAVSEA Basic Paint Inspector (NBPI) course or NACE International Coating Inspector Program (CIP) Level One or higher.

3.2.6 Coating inspectors must be certified in accordance with the NAVSEA Basic Paint Inspector (NBPI) course or NACE International Coating Inspector Program (CIP) Level One or higher. The inspector must have passed the SSPC Thermal Spray Inspector Training course or NAVSEA-approved equivalent, and have a minimum of 6 months of thermal spray quality assurance (QA) experience.

3.3 Record and maintain in-process records on QA Checklist Form, Appendix A, and, for color top system application, the QA Checklist Form Appendices One, 2, 6, and 7a of 009-32 of 2.1.

3.3.1 Submit one legible copy of QA appendices in hard copy or approved transferrable media of recorded in-process information on QA Checklist Form Appendices to the SUPERVISOR within 72 hours of completion of preservation of each separate location listed in the invoking Work Item or task order.

3.3.2 QA Checklist Form Appendices of 2.1 are available at http://www.nstcenter.biz.

3.4 Submit one legible copy of the containment design 14 days before erecting the containment for approval by the SUPERVISOR.

3.5 Complete the water break test when required in accordance with 2.4:

3.5.1 Use deionized or distilled water.

3.5.2 Evaluate the surface for hydrocarbon contamination in accordance with 2.4. Dry the surface using a lint free cloth.

3.5.3 The "testing of processing environments" described in 2.4 does not apply.

3.6 For TSN, conduct Film Thickness (FT) measurements as follows:

3.6.1 A Type 2 gauge in accordance with SSPC-PA 2 of 2.3 with a probe diameter of 0.20 inches or smaller, a sample diameter of 0.12 inches or smaller, and capable of measuring TSN FT from 25 to 150 mils must be used.

3.6.2 For FT measurements, one spot measurement is the average of 10 individual gauge readings that are made along a 24-inch straight-line perpendicular to the application direction. Do not place FT probe on atypical high spots or irregularities (e.g., spatter).

3.7 Product storage:

3.7.1 Store TSN wire in a dry place in accordance with manufacturer's storage requirements. Document the name of the thermal spray wire, manufacturer, batch/lot number, and date of expiration on QA Checklist Form, Appendix A. Record the batch/lot number for the thermal spray wire material in "Product Information" section on QA Checklist Form, Appendix A.

3.7.2 Store and monitor liquid coatings in accordance with 009-32 of 2.1.

3.8 Do not use partial kits when using multiple component coatings that are to be applied to the TSN in overlap areas and the prepared steel bordering the TSN application, unless using verified proportioning equipment or other verified measuring equipment (gravimetric).

3.9 Install masking material appropriate for blasting. For thermal spray masking, use material such as DeWAL Industries Inc. DW501 or equivalent material as approved by NAVSEA, for protection of equipment and items in work area not to be coated. Remove masking material upon completion of final TSN coating.

3.9.1 Mask flight deck tie-downs, recessed flight deck lights, deck fittings, and protrusions that are not to be coated with the TSN using masking material. Masking must extend 1-2 inches onto the deck from the welded edge of tie-downs, recessed flight deck lights, deck fittings, and protrusions.

3.10 Clean polyethylene shoe coverings must be worn when walking on prepared or coated surfaces. Shoe coverings must be selected that do not degrade and contaminate surfaces. Use of adhesive tape (e.g., duct tape) as shoe covering is prohibited.

3.11 Erect and maintain a containment structure and ventilation system over the designated work area in accordance with the design approved by the SUPERVISOR.

3.11.1 The containment must include a sub-containment enclosure, or spray equipment shrouding, within the overall containment. The enclosure must meet the dust mitigation requirements of 2.5. The enclosure, or spray equipment shrouding, must contain dust generated by the TSN process and capture dust in a bag house or other dust collection equipment as approved by the SUPERVISOR.

(V)(G) “CONTAINMENT AND VENTILATION INSTALLATION”

3.11.2 Verify installation of containment structure and operation of ventilation and dust collection systems in accordance with the design approved by the SUPERVISOR.

3.11.2.1 Containment and associated ventilation systems are to be in place and operational prior to start of any surface preparation operations and must remain in place and operational until cure to service of color topping.

(V) “VERIFY CONTAINMENT AND ENCLOSURE INSTALLATION”

3.11.3 Move and install containment and enclosure to additional work areas.

(V) “ENVIRONMENTAL READINGS”

3.12 Measure ambient and substrate surface temperatures, relative humidity, and dew point inside the containment and within close proximity to the enclosure. These data must be collected and recorded from the beginning of abrasive blasting through cure to service of the color topping.

3.12.1 Environmental readings must be measured and recorded at a minimum of once per hour with a data logger. Measure and record a manual reading once every 24 hours and at every (G)-point with a separate calibrated device independent of the data logger to confirm data logger readings. These manual readings must be documented on QA Checklist Form, Appendix A, and, for color top system application on QA Checklist Form, Appendix 1 of 009-32 of 2.1.

3.12.2 Accomplish Secondary Surface Preparation and TSN application process under the following conditions: the ambient air and deck temperature within the sub-containment must be maintained at a minimum of 40 degrees Fahrenheit and a minimum of 5 degrees Fahrenheit above the dew point. The maximum relative humidity within the sub-containment must be maintained at less than 50 percent.

3.12.3 For the color top system, measure and record the environmental readings from prior to the start of application of the coatings until 48 hours of creditable cure time as defined in 009-32 of 2.1. For coatings that fully cure to service in less than 48 hours, as defined on their NAVSEA-reviewed ASTM F718 data sheets, environmental readings for the final coat must be measured and recorded until the coating's cure to service time is reached.

3.13 Remove existing deck coating in the TSN application area within the containment using vacuum, self-contained UHP WJ equipment in accordance with Table One, Column A.

3.13.1 Remove existing deck coating using UHP WJ from an additional 12 to 18 inches on each side of the intended TSN area to allow for a tie-in area with MIL-PRF-24667 nonskid.

(V) "PRIMARY SURFACE PREPARATION"

3.13.2 Verify primary surface preparation is in accordance with Table One, NACE/SSPC-SP WJ-2/L of 2.3. Document primary surface preparation on QA Checklist Form, Appendix A.

(I)(G) "CONDUCTIVITY MEASUREMENT"

3.13.3 Accomplish surface conductivity measurements on the prepared deck. One reading must be taken for the first 200 square feet. Additional readings must be taken for every additional 400 square feet or less. Conductivity measurements must not exceed 30 micro-siemens/cm. Conductivity samples must be collected using a product that meets the requirements of 2.6. Document on QA Checklist Form, Appendix A. Accomplish surface conductivity measurement within 8 hours prior to abrasive blasting.

3.13.3.1 Clean areas where conductivity exceeds requirements using LP WC equipment with potable water to NACE/SSPC-SP WJ-4 of 2.3. Dry the affected areas and remove any standing water. Accomplish surface conductivity measurements on affected areas in accordance with 3.13.3.

(I)(G) "CLEANLINESS PRIOR TO ABRASIVE BLASTING"

3.13.4 Accomplish degreasing/cleaning prior to surface preparation to ensure that the surface is free of contaminants in accordance with SSPC-SP 1 of 2.3.

3.13.4.1 Accomplish a visual water break test on the cleaned surface in accordance with paragraph 3.5. One water break test must be accomplished on every 200 square feet of the waterjet cleaned surface. In addition, water break tests must be accomplished on stained or discolored areas that visually indicate hydrocarbon or other contamination. Accomplish degreasing/cleaning of areas with hydrocarbon or other contamination in accordance with SSPC-SP 1 of 2.3 until the surface is free of hydrophobic contaminants as evident by water droplets spreading immediately to form a thin, continuous uniform water film. Document surface cleanliness on QA Checklist Form, Appendix A and document the water break test results on QA Checklist Form, Appendix A.

3.14 Prepare surfaces to be coated with TSN to a white metal blast, SSPC-SP 5/NACE 1 of 2.3 in accordance with Table One, Column B.

3.14.1 Blast media must conform to SSPC-AB 1 of 2.3 or A-A-59316 of 2.13, and be a blend of 50 percent 16-mesh grit aluminum oxide and 50 percent 24-mesh grit aluminum oxide. Submit one legible copy, in hard copy or approved transferrable media, of the blast media conformance data package to the SUPERVISOR prior to blasting.

3.14.2 Initiate abrasive blasting within 10 hours of accomplishing UHP WJ in accordance with 3.13.1. When surface profile is not established within 10 hours the surface cleanliness must be verified in accordance with 3.13.2, 3.13.3, and 3.13.4.

3.14.3 Recycling or re-use of the abrasive is prohibited.

(V) “VERIFY COMPRESSED AIR QUALITY”

3.14.4 Compressed air must be free of water and oil in accordance with 2.7.

3.14.5 Remove abrasive media using a vacuum equipped with a nonmarring hose. Remaining abrasive and dust in TSN application area must be blown down with clean, dry air to a localized area and completely removed with the vacuum.

(I)(G) “SECONDARY SURFACE PREPARATION”

3.14.6 Verify secondary surface preparation is in accordance with Table One, Column B including the welds. Document secondary surface preparation on QA Checklist Form, Appendix A.

(I)(G) “SURFACE PROFILE”

3.14.7 Measure surface texture as defined in 2.8 using Root Mean Square Slope (RΔq), and document the surface texture data on QA Checklist Form, Appendix A. Measure surface profile as defined in 2.9 and document the profile data on QA Checklist Form, Appendix A.

3.14.7.1 Take one RΔq measurement every 400 square feet in accordance with 2.10. One RΔq measurement is defined as the mean of 5 individual readings. The measured RΔq must be 0.45 or greater.

3.14.7.2 Take two profile measurements every 100 square feet using Method B of 2.9. One profile measurement is defined as the mean of 10 individual gauge readings. The 10 individual gauge readings and the mean must be documented. The profile must be between 4.0 and 10.0 mils. Profile must not be measured within one inch of any weld or on any uneven, gouged, or pitted surface.

(I)(G) "DUST TEST"

3.14.8 Accomplish a surface cleanliness inspection for dust and document on Appendix A. Surface dust must be a maximum of Rating 2, Class 2, of 2.11. Three individual readings must be taken for every 400 square feet. Individual tape samples must be retained and applied to the back of QA Checklist Form, Appendix A and labeled with the date, time, and work area or zone.

3.15 Accomplish thermal spray application in accordance with Table One.

3.15.1 Initiate TSN coating application within 10 hours of the completion of abrasive blasting in accordance with 3.14. When TSN application is not initiated within 10 hours, the surface cleanliness must be verified in accordance with 3.14.6 and 3.14.8.

(V) "VERIFY SECONDARY SURFACE PREPARATION PRIOR TO TSN APPLICATION"

3.15.2 Verify just prior to TSN application that the surface still satisfies requirements in Table One, Column B.

3.15.3 Prepare witness coupons in accordance with the following:

3.15.3.1 Prepare witness coupons within 10 hours of initiating TSN application during each work shift.

3.15.3.2 Witness coupons must consist of three cold-rolled steel test plates of dimensions 2 inches by 8 inches by 0.0625 inches or as approved by NAVSEA. Clean each witness coupon plate using the same cleaning procedures used on the deck to satisfy the cleaning requirements of 3.13.4. Abrasive blast each witness coupon plate using the same abrasive blasting procedures used on the deck to satisfy the surface preparation requirements of 3.14.6 and 3.14.7.Accomplish one surface profile measurement in accordance with Method B of 2.9 on

each witness coupon plate. Record the profile for witness coupons on QA Checklist Form, Appendix A.

3.15.3.3 Secure the witness coupons to masked tie-downs within the TSN application area at the start of each work shift such that the witness coupons do not move during thermal spray application. Space the witness coupons uniformly across the application area. The witness coupons must remain in place during the application of the first layer of TSN to the deck so that the witness coupons are coated simultaneously with the coating of the deck.

3.15.4 Accomplish TSN application to designated deck areas using the qualified procedure of 2.2.

3.15.4.1 Accomplish the requirements of 3.12 for environmental readings.

(I) "THERMAL HAND SPRAY AND ROBOTIC SPRAY APPLICATION MACHINE SETTINGS"

3.15.4.2 Verify and document thermal hand spray and robotic spray machine settings and spray parameters are in accordance with the qualified procedure of 2.2 at the start of each work shift on QA Checklist form, Appendix A.

3.15.4.3 Apply the TSN coating 6 to 9 inches beyond the designated TSN application area to facilitate the tie-in area to the surrounding MIL-PRF-24667 nonskid coating system.

3.15.4.4 Apply TSN 24 to 36 inches from the inboard face of the wheel stops and other areas as directed by the SUPERVISOR.

3.15.4.5 Overlap TSN between work zones in accordance with qualified procedure of 2.2.

3.15.4.6 Document start and end time for the application of each layer of thermal spray on QA Checklist Form, Appendix A.

(I) "MANDREL BEND WITNESS COUPONS"

3.15.5 Test the three witness coupon plates immediately following the application of the first layer of TSN after the plates cool to below 120 degrees Fahrenheit. Take three individual FT gauge readings on each witness coupon plate. Record each measurement on QA Checklist Form, Appendix A. Accomplish Test Method B – Cylindrical Mandrel Test of 2.12 on each panel. The mandrel rod diameter must be 2.25 inches. The witness coupon plates must be bent to 180 degrees and visually inspected without magnification for spalling, flaking or delamination in accordance with Attachment A. Any spalling, flaking, or delamination of the coating on any one of the three witness coupon plates must constitute a mandrel bend test failure. Cracking without spalling, flaking or delamination is acceptable.

Flaking within 0.125 inches from the witness coupon plate edges is acceptable. Record the mandrel test results on QA Checklist Form, Appendix A. The witness coupon plates must be labeled with the date, time, and location, and must be provided to the SUPERVISOR upon request.

3.15.5.1 Notify the SUPERVISOR of any mandrel bend test failure. A mandrel bend test failure must require removal of TSN applied to the work zone during that work shift in accordance with 3.13. A new set of three witness coupon plates must be installed in the work zone at the start of the work shift. The work zone must be re-blasted in accordance with 3.14 and TSN installed in accordance with 3.15.

(V) "THERMAL SPRAY VISUAL INSPECTION"

3.15.6 Accomplish a visual inspection of each layer of the TSN system. There must be no blistering, delamination, spalling, or cracking of the TSN coating. The nonskid surface must be visually free of drips, beads, and spatter greater than one square inch in area. Retain drips, beads, and spatter smaller than one square inch that are adherent and that cannot be dislodged by a dull putty knife. When determining FT conformance to the qualified procedure of 2.2 in the overlap area, the coating FT must be in accordance with the requirements in the qualified procedure. Document inspection on QA Checklist Form, Appendix A.

3.15.6.1 Repair blistering, delamination, spalling, or cracking of the TSN coating using TSN hand spray equipment application in accordance with Attachment C or D based on the area for each repair or cumulative repair area, as defined by the SUPERVISOR. Apply TSN to individual and cumulative repair areas in accordance with Attachment C or D as defined by the SUPERVISOR. Individual and cumulative TSN hand spray application area must not exceed 20 square feet in each 200 square foot area. Individual and cumulative blistering, delamination, spalling, or cracking of the TSN coating in excess of 20 square feet must require complete removal and reapplication of TSN in the entire 200 square foot area in accordance with Attachment B.

(I)(G) "FT MEASUREMENTS"

3.15.7 Accomplish FT measurements on the TSN only after the deck has cooled to less than 120 degrees Fahrenheit.

3.15.7.1 Take deck FT measurements on final TSN system in accordance with 3.6. Five spot measurements as defined in 3.6.2 must be taken every 200 square feet. The measurements must be recorded on QA Checklist Form, Appendix A.

3.15.7.2 Evaluate areas of low FT identified in 3.15.7.1 by taking one FT reading at 3 inch intervals in 8 equally spaced directions radiating outward from the initial low FT reading as shown in Attachment E, until 2 consecutive conforming FT readings are achieved or until no additional measurements are possible. Record FT measurements and

submit a sketch defining the areas of low FT in hard copy, or approved transferrable media, to the SUPERVISOR.

3.15.7.3 Verify surface cleanliness and apply additional TSN in areas of low FT using TSN hand spray or robotic spray application equipment to meet the FT requirements of the qualified procedure of 2.2.

3.15.7.4 Evaluate areas of TSN with a FT greater than 150 mils identified in 3.15.7.1 by taking one FT reading at 3 inch intervals in 8 equally spaced directions radiating outward from the initial FT reading greater than 150 mils as shown in Attachment E, until 2 consecutive conforming FT readings are achieved or until no additional measurements are possible. Record FT measurements and submit a sketch defining the areas of FT in excess of 150 mils in hard copy, or approved transferrable media, to the SUPERVISOR.

3.15.7.5 TSN with FT greater than 150 mils, in areas larger than one square inch must be removed to bare steel in accordance with Attachment C or D based on the area for each individual or cumulative area with FT greater than 150 mils, as defined by the SUPERVISOR. Apply TSN to individual and cumulative repair areas in accordance with Attachment C or D as defined by the SUPERVISOR. Individual and cumulative TSN hand spray application areas must not exceed 20 square feet in each 200 square foot area. Individual and cumulative TSN areas with FT greater than 150 mils in excess of 20 square feet must require complete TSN removal and reapplication of TSN in the entire 200 square foot area in accordance with Attachment B.

3.16 Accomplish cleaning of TSN in accordance with Table One, Column E following the completion of TSN application and prior to application of sealer.

3.16.1 For TSN installation areas less than 200 square feet, sweep TSN area with a stainless steel wire or a stiff nylon bristle brush/broom as approved by the SUPERVISOR to remove thermal spray dust and non-adherent TSN peaks within 24 hours of completing TSN spray application. Remove thermal spray dust and non-adherent peaks using a vacuum with a non-marring hose. Remaining dust and non-adherent peaks in the TSN installation area must be blown down with clean, dry air to a localized area and completely removed with the vacuum.

3.16.2 For TSN installation areas larger than 200 square feet, complete TSN installation to the entire TSN installation work zone. Sweep TSN installation work zone with a stainless steel wire or a stiff nylon bristle brush/broom as approved by the SUPERVISOR to remove thermal spray dust and non-adherent TSN peaks within 48 hours of completing TSN spray application. Remove thermal spray dust and non-adherent peaks using a vacuum with a non-marring hose. Remaining dust and non-adherent peaks in the TSN area must be blown down with clean, dry air to a localized area and completely removed with the vacuum.

3.16.3 For TSN installation areas larger than 200 square feet, clean entire TSN work zone using potable water and LP WC equipment to NACE/SSPC-SP WJ-4 of 2.3. Operate the LP WC equipment with potable water at 2,500 to 3,000 PSI. The LP WC equipment must

include a rotating or reciprocating high pressure bar fitted with LP WC nozzles and a vacuum water and debris collection system. The nozzle type, such as fan or jet, and nozzle angles must be configured to provide the necessary cleaning pattern while not causing visible etching, patterns, or other damage on the TSN. The vacuum system must be configured to remove debris and water from the deck rapidly enough to prevent the formation of puddles on the TSN.

3.16.4 For TSN installation areas larger than 200 square feet, accomplish a visual cleanliness inspection without magnification, for complete removal of surface contamination. Secure the cleaned area from traffic (e.g., personnel and equipment) and allow area to dry for a minimum of 12 hours at a maximum relative humidity of 70 percent and minimum deck temperature of 50 degrees Fahrenheit.

(I)(G) "TSN CLEANLINESS"

3.16.5 Verify TSN surface is free of contaminants in accordance with SSPC-SP 1, paragraph 2.1, of 2.3. Accomplish water-break tests on any discoloration or spots that visually indicate hydrocarbon or other contamination. Accomplish degreasing/cleaning of areas with hydrocarbon or other contamination areas in accordance with SSPC-SP 1 of 2.3 until the surface is free of hydrophobic contaminants as evident by water droplets spreading immediately to form a thin, continuous uniform water film. Document inspection result on QA Checklist Form, Appendix 2 of 009-32 of 2.1, as specified in 3.13.4.1.

3.16.5.1 For any area of TSN that exhibits water droplets that do not spread immediately to form a thin, continuous uniform water film during the water-break test after degreasing/cleaning, conduct a black light inspection using a high intensity UV-A flashlight to identify the location of hydrocarbons or other contamination. Only clean/degrease locations where the presence of hydrocarbons or other contaminants is confirmed by the black light inspection.

(V) "SEALER APPLICATION"

3.17 Verify just prior to sealer application that the TSN is clean and dry in accordance with 3.16.

3.17.1 Accomplish the requirements of 3.12.1 for environmental readings.

3.17.2 Mask outermost 6 to 18 inches of TSN to prevent application of sealer to TSN tie-in areas where overcoating with MIL-PRF-24667 nonskid is required.

3.17.3 Apply NAVSEA-approved TSN sealer in accordance with Table One, Column F within 24 hours of completing TSN cleaning in accordance with 3.16. Document application of the TSN sealer on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

(V) "DARK GRAY COLOR TOP APPLICATION"

3.18 Verify just prior to dark gray color top application that the TSN sealer is cured to support foot traffic in accordance with the NAVSEA-reviewed ASTM F718.

3.18.1 Accomplish the requirements of 3.12.1 for environmental readings.

3.18.2 Prepare companion panels in accordance with the following:

3.18.2.1 Prepare companion panels within 24 hours of the sealer curing to support foot traffic.

3.18.2.2 Companion panels must be cold-rolled steel or aluminum test plates that are a minimum of 4 inches by 6 inches by 0.02 inches or as approved by NAVSEA. Clean each companion panel by wiping with cleaning solvent in accordance with SSPC-SP 1 of 2.3. Hand sand one side of each companion panel using 80 to 120 grit sand paper to produce a uniform pattern of scratches.

3.18.2.3 For sealed TSN that will be coated with the dark gray color topping, two companion panels are required for the first 1,000 square feet, and one panel is required for each additional 1,000 square feet or less. Orient the companion panels such that color topping will be applied to the hand sanded surface. The panels must be secured to tie down fittings or the deck such that they will not be dislodged during color topping spray and roller application. Space the companion panels uniformly across the color topping application area so that the panels are coated with color topping simultaneously with the coating of the sealed TSN on the surrounding deck.

3.18.3 Mask outermost 6 to 18 inches of TSN to prevent application of dark gray color topping to TSN tie-in areas where overcoating with MIL-PRF-24667 nonskid is required.

3.18.4 Inspect the location and color of required VLA markings in accordance with 009-32 of 2.1, Naval Air Warfare Center Aircraft Division (NAWCAD) Class Guidance Drawings, Air Capable Ship Aviation Facilities Bulletin, Amphibious Assault Ship Aviation Facilities Bulletin, Shipboard Aviation Resume (NAECENG-7576), VLA General Service Bulletin No. 8 (latest revision) or by contacting the local NAWC (CAFSU/ASIR) Field Office. VLA markings are not to be applied over dark gray color topping.

3.18.4.1 Mask VLA marking areas to prevent application of dark gray color top. Overlap of VLA marking colors onto dark gray must not exceed 1/2 inch.

3.18.5 Mix and apply NAVSEA-approved dark gray color top in accordance with the product's NAVSEA-reviewed ASTM F718 data sheet or as approved by NAVSEA. Document application of the TSN color top on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

3.18.5.1 Complete application of dark gray color top to sealed TSN in the work zone, excluding areas that will receive VLA markings and masked areas of 3.18.3,

within 5 days of the sealer curing to support foot traffic in accordance with the ASTM F718. Document dark gray color top application in accordance with Table One, Column G.

(V) "WFT MEASUREMENTS – DARK GRAY COLOR TOPPING"

3.18.5.2 Accomplish in-process WFT measurements on companion panels immediately after they have been coated with dark gray color top. One WFT measurement per companion panel is required after spray and roller application. WFT measurements must comply with Table One, Column G. Record the WFT readings on QA Checklist Form, Appendix 7A of 009-32 of 2.1.

3.18.5.3 Allow NAVSEA-approved dark gray color top to cure to support foot traffic in accordance with the NAVSEA-reviewed ASTM F718 product data sheet. Remove masking in areas that will receive VLA markings.

(V) "VLA MARKING COLOR TOP APPLICATION"

3.19 Verify just prior to VLA marking color top application that the dark gray color top has cured to support foot traffic in accordance with the NAVSEA-reviewed ASTM F718.

3.19.1 Accomplish the requirements of 3.12.1 for environmental readings.

3.19.2 Prepare companion panels in accordance with the following:

3.19.2.1 Prepare companion panels within 24 hours of the dark gray color top curing to support foot traffic.

3.19.2.2 Companion panels must be cold-rolled steel or aluminum test plates that are a minimum of 4 inches by 6 inches by 0.02 inches or as approved by NAVSEA. Clean each companion panel by wiping with cleaning solvent in accordance with SSPC-SP 1 of 2.3. Hand sand one side of each companion panel using 80 to 120 grit sand paper to produce a uniform pattern of scratches.

3.19.2.3 For areas less than 1,000 square feet of TSN to be coated with VLA marking color top, secure one companion panel to tie down fittings or the deck so that the panel will not be dislodged during color top spray and roller application. The companion panel must be secured such that the color topping will be applied to the hand sanded surface. Locate the companion panel so that the panel is coated with color topping simultaneously with the coating of the sealed TSN.

3.19.3 Mask TSN with dark gray color top around VLA marking areas. Overlap of VLA marking colors onto dark gray must not exceed 1/2 inch.

3.19.4 Inspect the location and color of required VLA markings in accordance with 009-32 of 2.1, Naval Air Warfare Center Aircraft Division (NAWCAD) Class Guidance Drawings, Air Capable Ship Aviation Facilities Bulletin, Amphibious Assault Ship Aviation

Facilities Bulletin, Shipboard Aviation Resume (NAECENG-7576), VLA General Service Bulletin No. 8 (latest revision) or by contacting the local NAWC (CAFSU/ASIR) Field Office.

3.19.5 Mix and apply each VLA marking color of the NAVSEA-approved color top in accordance with the product's NAVSEA-reviewed ASTM F718 data sheet or as approved by NAVSEA. Document application of the TSN color top on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

3.19.5.1 Complete application of VLA color top to sealed TSN in the work zone, excluding masked areas of 3.18.3, within 7 days of the sealer curing to support foot traffic in accordance with the ASTM F718. Document VLA marking color top application in accordance with Table One, Column H.

(V) "WFT MEASUREMENTS – VLA MARKING COLOR TOPPING"

3.19.5.2 Accomplish in-process WFT measurements companion panels immediately after they have been coated with VLA marking color topping. One WFT measurement per companion panel is required after spray and roller application. WFT measurements must comply with Table One, Column H. Record the WFT readings on QA Checklist Form, Appendix 7A of 009-32 of 2.1.

3.19.5.3 Allow NAVSEA-approved VLA marking color topping to cure to support foot traffic in accordance with the NAVSEA-reviewed ASTM F718 product data sheet. Remove masking from area around VLA markings.

(I)(G) "COLOR TOPPING HOLIDAY INSPECTION"

3.19.6 Verify color topping coverage. Touch-up any holidays in the color topping as directed by the SUPERVISOR.

3.19.6.1 Remove all masking from the TSN installation work zone.

(V) "INSTALL MIL-PRF-24667 NONSKID ADJACENT TO TSN"

3.20 Accomplish MIL-PRF-24667 nonskid system application to tie in areas, deck tie-down fittings, areas around recessed flight deck lights, and to areas around other designated deck fittings in accordance with 009-32 of 2.1.

3.20.1 Apply MIL-PRF-24667 nonskid system in accordance with 009-32 of 2.1, table and line citation in the Work Item or task order, for the tie-in areas. The MIL-PRF 24667 nonskid system must overlap onto the newly applied TSN up to the edge of the TSN color topping. Overlap of MIL-PRF-24667 nonskid system onto TSN color topping must not exceed 1/2 inch.

3.20.2 Accomplish coating of deck tie-down fittings, areas around recessed flight deck lights, and other designated deck fittings in accordance with 009-32 of 2.1. The coating must overlap onto surrounding TSN up to the edge of the TSN color topping. Overlap of the coatings onto TSN color topping must not exceed 1/2 inch.

4. NOTES:

4.1 Clarification of terms:

4.1.1 The term tie-in area is defined as the area where MIL-PRF 24667 nonskid is applied over the prepared steel deck and the outer edge of the TSN.

4.1.2 The term overlap is defined as the area where newly applied TSN is applied to prepared steel and extends over adjacent retained TSN.

4.1.3 The color top system is defined as a NAVSEA-approved system that includes a clear TSN sealer, dark gray color topping, and all other color toppings required to install Visual Landing Aid (VLA) markings.

4.1.4 The term repair area is defined as the individual locations requiring repair or replacement as defined by the SUPERVISOR and not the cumulative sum of all individual sites of TSN damage or delamination on the entire deck. The SUPERVISOR must determine when individual repair areas are to be grouped into one large repair area or discretely repaired as individual areas.

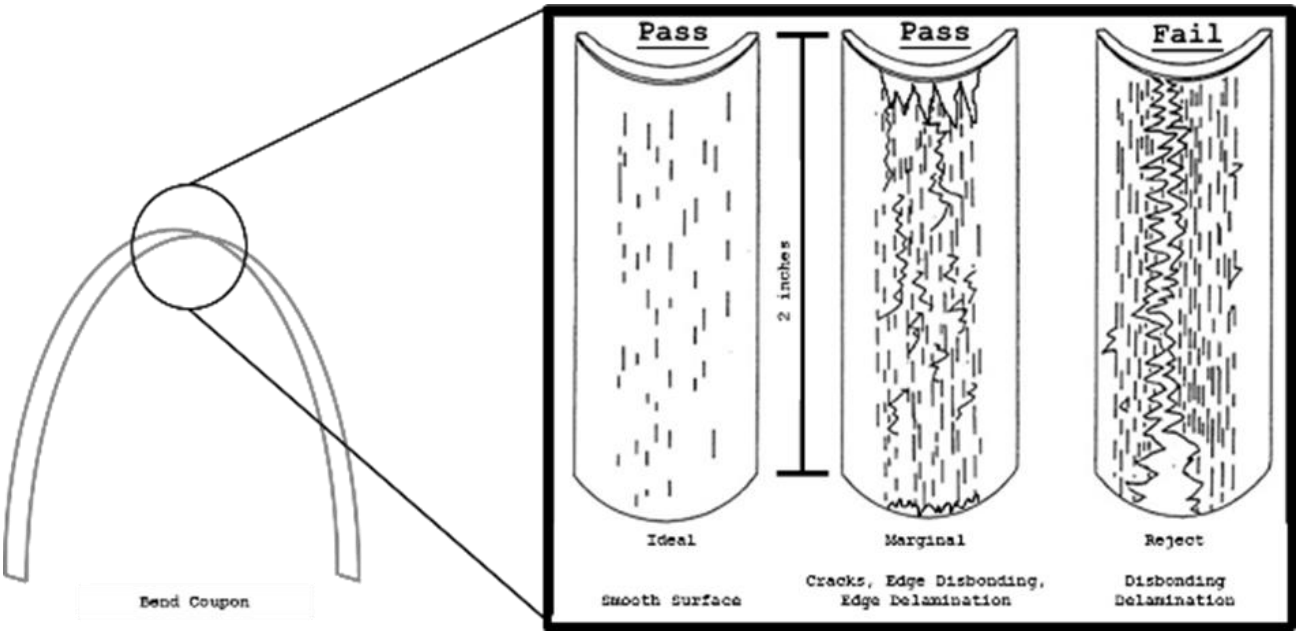
4.1.5 The term back roll is defined as the process of using a 1/4 inch or 3/8 inch nap roller, without additional color topping or a roller tray, to reroll uncured sealer and color topping on TSN to minimize the amount of liquid coating on the TSN while ensuring complete coverage and a uniform color.

4.2 To reduce the risk of TSN shrinkage stress creating in-service cracks, avoid positioning the robotic TSN installation system such that the point at which the short axis of the thermal spray machine reverses direction (i.e. the position where the thermal spray heads stop moving in one direction and then move back in the other direction) is over a deck weld.

4.3 Orient enclosure parallel to ship's main axis. Orient the long axis of the thermal spray machine inside the enclosure parallel to the ship's main axis.

ATTACHMENT A

Mandrel Bend Test Pass/Fail Coupons



ATTACHMENT B

Repair Procedure for Greater that 200 Square Feet of TSN that is Removed by HP WJ and TSN Installation Using TSN Robotic and Hand Spray Application Equipment

1. The repair area must be designated and marked by the NAVSEA-approved Technical Representative.

2. As directed by the SUPERVISOR, install steel masking plates around the edges of the repair area in accordance with Figures B-1 and B-2, to maintain a straight edge on retained TSN. The masking plates must be between 1/16-inch and 1/8-inch thick, a minimum of 6 inches wide, and placed along the edge of the repair in a manner such that some part of the plate is in direct contact with the deck in accordance with Figure B-3.

3. As directed by the SUPERVISOR and in accordance with Table One, Line 2, Column A, remove TSN within the repair area with HP WJ and maintain pressure between 22,000 and 25,000 PSI. Conduct ten HP WJ passes over entire repair area to ensure complete TSN removal.

    a. HP WJ pressures in excess of 25,000 PSI will damage the retained TSN under the steel masking plates.

4. Hand sand TSN edge using 80 – 120 grit paper or pad to remove sharp burrs or slivers along the edge of retained TSN.

5. Accomplish the QA checkpoints in accordance with 3.13.2, 3.13.3, 3.13.4 and document the results on QA Checklist Form, Appendix A.

6. Install steel masking plates to protect the retained TSN from abrasive blasting.

    a. Align steel masking plates for abrasive blasting with the edge of the retained TSN in accordance with Figure B-4.

    b. Place steel masking plate so that some part of the masking plate must be in direct contact with the retained TSN on the deck in accordance with Figure B-3.

7. In accordance with Table One, Line 2, Column B Abrasive blast the repair area in accordance with paragraph 3.14 and conduct QA checkpoints in accordance with paragraph 3.14. Remove steel masking plates and visually inspect the repair area, including the edge of adjacent, adherent, retained TSN, to verify NACE 1/SSPC-SP 5 of 2.3. Document the results on QA Checklist Form, Appendix A.

8. Install steel masking plates along the repair area for application of the first layer of TSN.

    a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure B-2. Align steel masking plates to extend 1/8 inch beyond the retained TSN edge to create a "shadow mask" in accordance with Figure B-5. Steel masking plates extending less than 1/16 inch beyond the retained TSN edge or greater than 3/16 inch beyond the retained TSN edge must be re-positioned in accordance with Figure B-5 before TSN robotic spray application.

9. In accordance with Table One, Line 2, Column C, accomplish robotic or hand thermal spray application of first layer of TSN and QA checkpoints in accordance with paragraph 3.15. Record the mandrel test results on QA Checklist Form, Appendix A. Hand spray applications must not exceed 800 square feet in any single repair area.

10. Install steel masking plates for the second layer of TSN in accordance with Figure B-6.

a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure B-2. Align steel masking plates with the retained TSN edge in accordance with Figure B-3.

11. In accordance with Table One, Line 2, Column D, accomplish robotic or hand thermal spray application of second layer of TSN and document QA checkpoints in accordance with paragraph 3.15. Record the FT results on QA Checklist Form, Appendix A. For all hand spray applications, ten spot measurements as defined in 3.6.2 must be taken for every 200 square feet or less.

12. Remove steel masking plates and in accordance with Table One. Line 2, Column E, clean TSN repair area and document cleaning in accordance with paragraph 3.16 on QA Checklist Form, Appendix A.

13. In accordance with Table One, Line 2, Column F, apply sealer to TSN in the repair area and document sealer application in accordance with paragraph 3.17 on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

a. Overlap of sealer onto areas of retained TSN must not exceed 1/2 inch.

14. In accordance with Table One, Line 2, Column G, apply dark gray color top to TSN in the repair area in accordance with paragraph 3.18 and document installation on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

a. Overlap of dark gray onto areas of retained TSN must not exceed 1/2 inch.

15. In accordance with Table One, Line 2, Column H, apply VLA marking color top to TSN in the repair area in accordance with paragraph 3.19 and document on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

a. Overlap of VLA Marking colors onto areas of retained TSN must not exceed 1/2 inch.

b. Overlap of VLA Marking colors on dark gray color top must not exceed 1/2 inch.

16. Accomplish MIL-PRF-24667 nonskid system application to tie in areas, deck tie-down fittings, areas around recessed flight deck lights, and to areas around other designated deck fittings in accordance with 009-32 of 2.1.

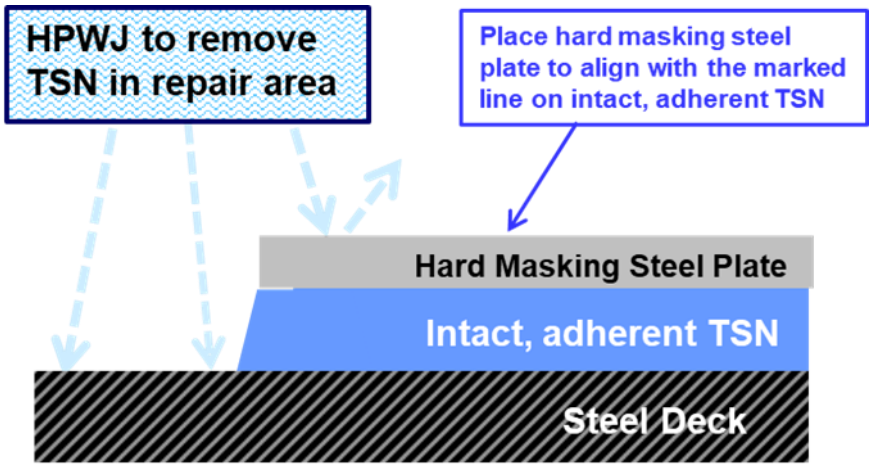


Figure B-1: Cross section view of masking alignment for TSN removal using HP WJ

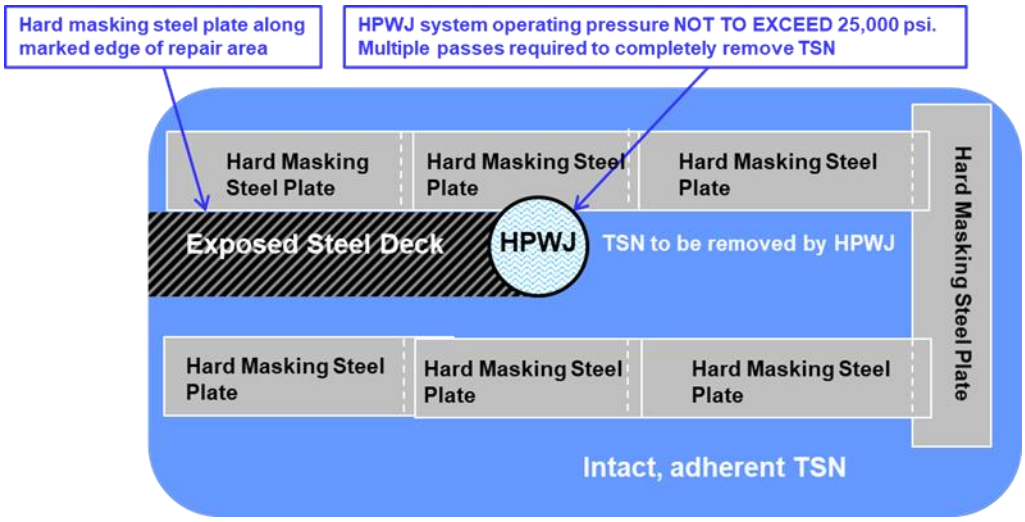


Figure B-2: Top view of masking alignment for TSN removal using HP WJ

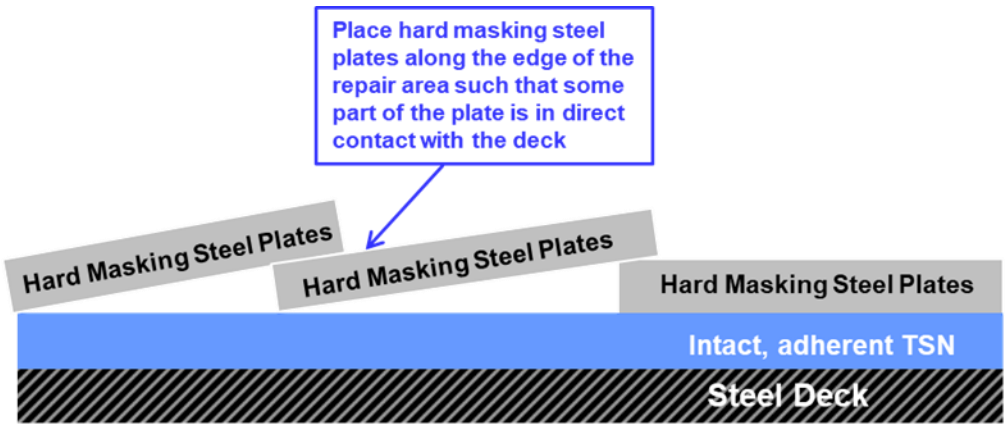


Figure B-3: Cross section view of hard masking plates placed along the edge of a TSN repair area for HP WJ

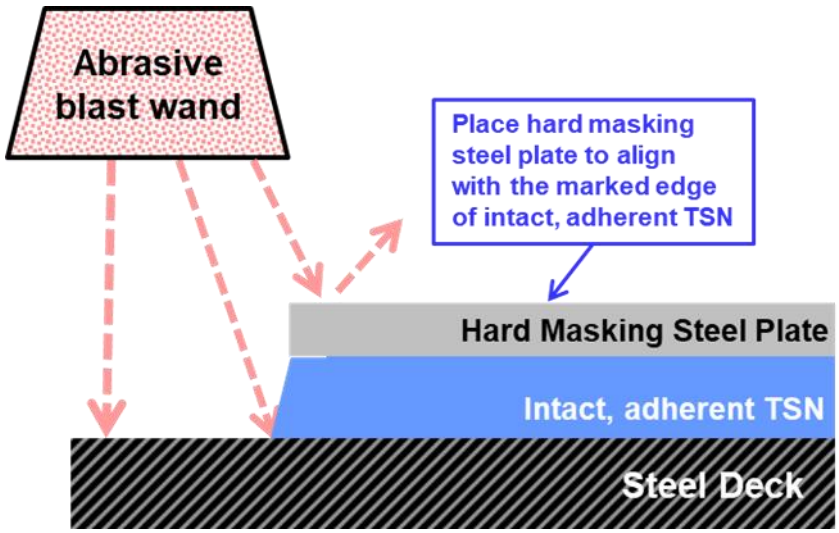


Figure B-4: Cross section view of masking alignment for abrasive blasting after HP WJ removal

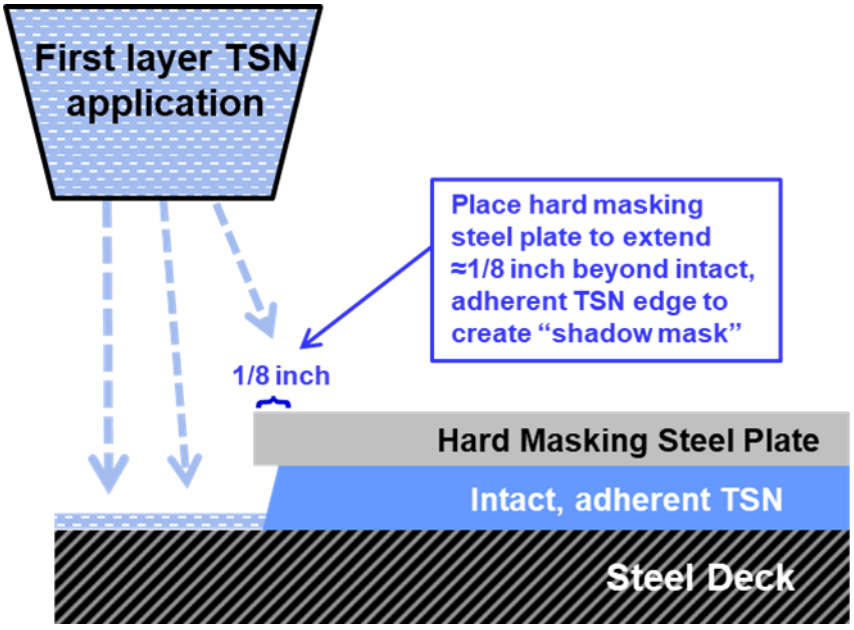


Figure B-5: Cross section view of shadow mask for first layer of TSN

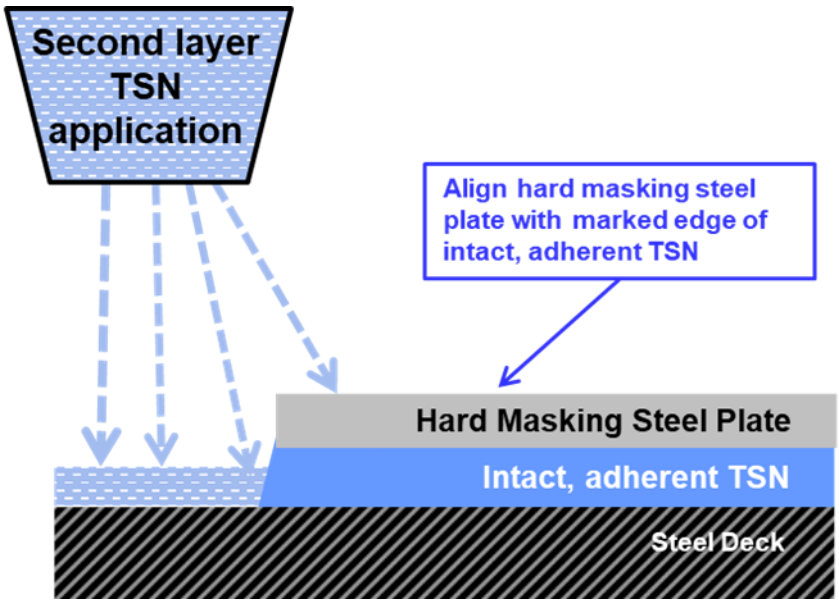


Figure B-6: Cross section view of second layer of TSN adjacent to intact, adherent TSN

ATTACHMENT C

Repair Procedure for 20 to 200 Square Foot Areas of TSN that Requires Removal by HP WJ and TSN Installation Using TSN Hand Spray Application Equipment

1. The repair area must be designated by the NAVSEA-approved Technical Representative.

2. As directed by the SUPERVISOR, install steel masking plates around the edges of the repair area in accordance with Figures C-1 and C-2, to maintain a straight edge on retained TSN. The masking plates must be a between 1/16 and 1/8-inch thick, a minimum of 6 inches wide, and placed along the edge of the repair in a manner such that some part of the plate is in direct contact with the deck in accordance with Figure C-3.

3. As approved by the SUPERVISOR and in accordance with Table One, Line 3, Column A, remove TSN within the repair area with HP WJ and maintain pressure between 22,000 and 25,000 PSI. Conduct ten HP WJ passes over entire repair area to ensure complete TSN removal.

    a. HP WJ pressures in excess of 25,000 PSI will damage the retained TSN under the steel masking plates.

4. Hand sand TSN edge using 80 – 120 grit paper or pad to remove sharp burrs or slivers along the edge of retained TSN.

5. Accomplish the QA checkpoints in accordance with 3.13.2, 3.13.3, 3.13.4 and document the results on Repair QA Checklist Form, Appendix b.

6. Install steel masking plates to protect the retained TSN from abrasive blasting.

    a. Align steel masking plates for abrasive blasting with the edge of the retained TSN in accordance with Figure C-4.

    b. Place steel masking plate so that some part of the masking plate must be in direct contact with the retained TSN on the deck in accordance with Figure C-3.

7. In accordance with Table One, Line 3, Column B, Abrasive blast the repair area in accordance with paragraph 3.14 and conduct QA checkpoints in accordance with paragraph 3.14. Remove steel masking plates and visually inspect the repair area, including the edge of adjacent, adherent, retained TSN, to verify NACE 1/SSPC-SP 5 of 2.3. Document the results on Repair QA Checklist Form, Appendix B.

8. Install steel masking plates along the repair area for application of the first layer of TSN.

a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure C-2. Align steel masking plates to extend 1/8 inch beyond the retained TSN edge to create a "shadow mask" in accordance with Figure C-5. Steel masking plates extending less than 1/16 inch beyond the retained TSN edge or greater than 3/16 inch beyond the retained TSN edge must be re-positioned in accordance with Figure C-5 before TSN hand spray application.

9. In accordance with Table One, Line 3, Column C, accomplish hand spray application of first layer of TSN and QA checkpoints in accordance with paragraph 3.15. Measure the FT of the first layer in accordance with paragraph 3.6 except that three spot measurements must be made for each repair area. Document the results on Repair QA Checklist Form, Appendix B.

10. Install steel masking plates for the second layer of TSN in accordance with Figure C-6.

    a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

    b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure C-2. Align steel masking plates with the retained TSN edge in accordance with Figure C-3.

11. In accordance with Table One, Line 3, Column D, accomplish hand spray application of second layer of TSN and document QA checkpoints in accordance with paragraph 3.15. Measure the FT of the second layer in accordance with paragraph 3.6 except that three spot measurements must be made for each repair area. Record the FT results on Repair QA Checklist Form, Appendix B.

12. Remove steel masking plates and in accordance with Table One, Line 3, Column E, clean TSN repair area and document cleaning in accordance with paragraph 3.16 on Repair QA Checklist Form, Appendix B.

13. In accordance with Table One, Line 3, Column F, apply sealer to TSN in the repair area in accordance with paragraph 3.17 and document sealing on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of sealer onto areas of retained TSN must not exceed 1/2 inch.

14. In accordance with Table One, Line 3, Column G, apply dark gray color top to TSN in the repair area in accordance with paragraph 3.18 and document top coat application on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of dark gray onto areas of retained TSN must not exceed 1/2 inch.

15. In accordance with Table One, Line 3, Column H, apply VLA marking color top to TSN in the repair area in accordance with paragraph 3.19 and document VLA marking color top application on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of VLA Marking colors onto areas of retained TSN must not exceed 1/2 inch.

    b. Overlap of VLA Marking colors on dark gray color top must not exceed 1/2 inch.

16. Accomplish MIL-PRF-24667 nonskid system application to tie in areas, deck tie-down fittings, areas around recessed flight deck lights, and to areas around other designated deck fittings in accordance with 009-32 of 2.1.

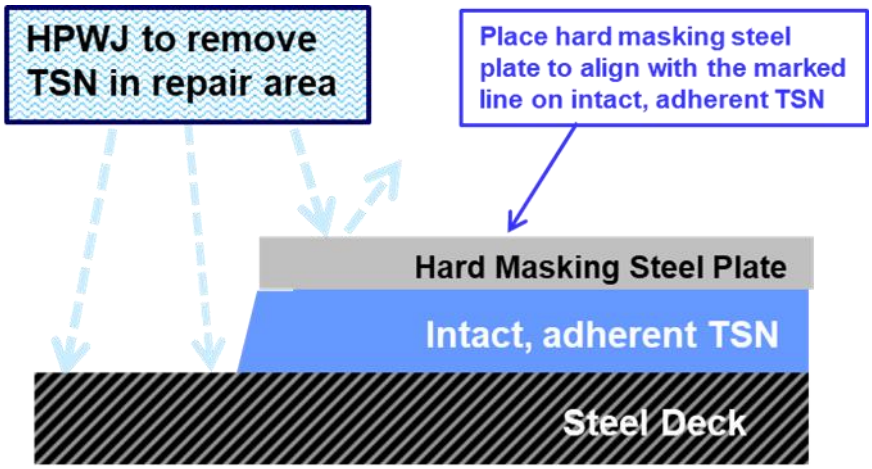


Figure C-1: Cross section view of masking alignment for TSN removal using HP WJ

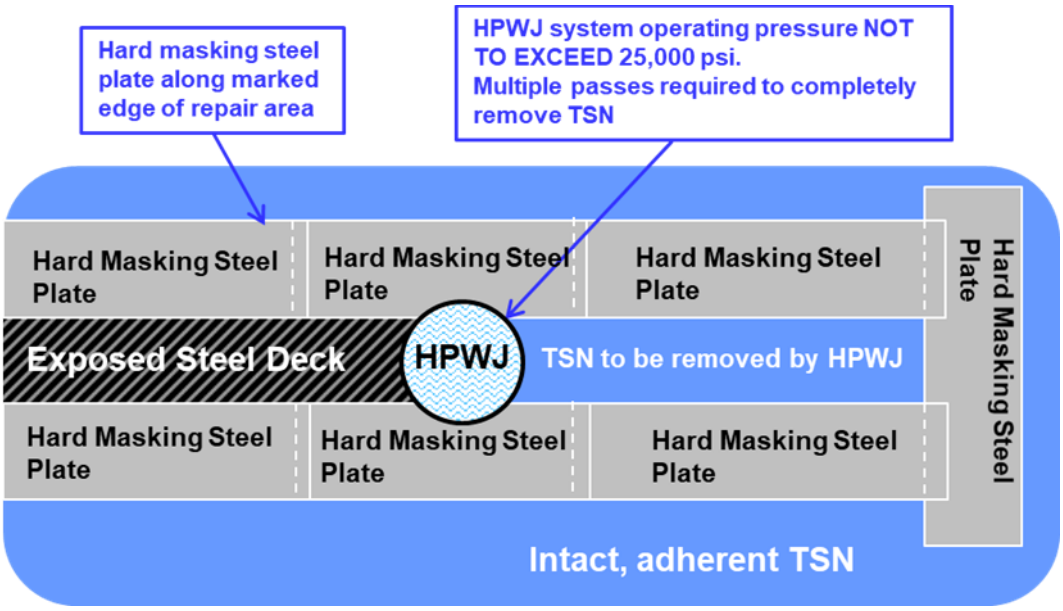


Figure C-2: Example of hard masking plate configuration for HP WJ

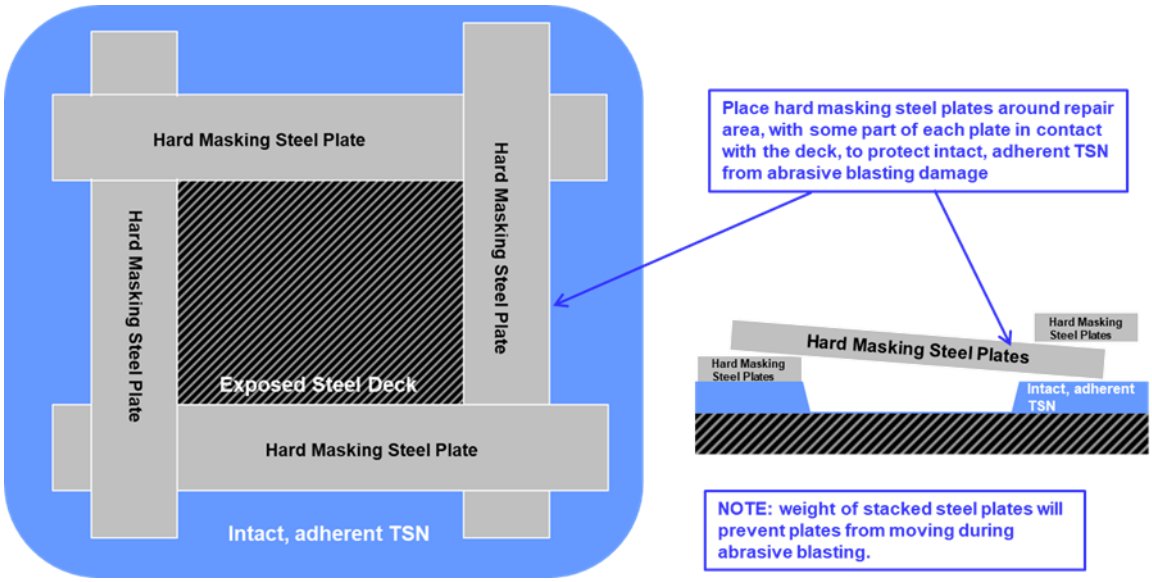


Figure C-3: Example of hard masking plate configuration around repair area

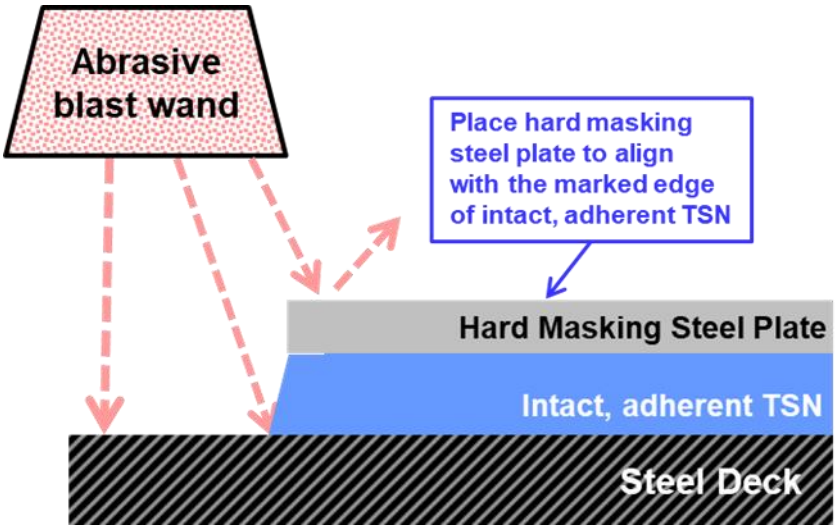


Figure C-4: Cross section view of masking alignment for abrasive blasting after HP WJ removal

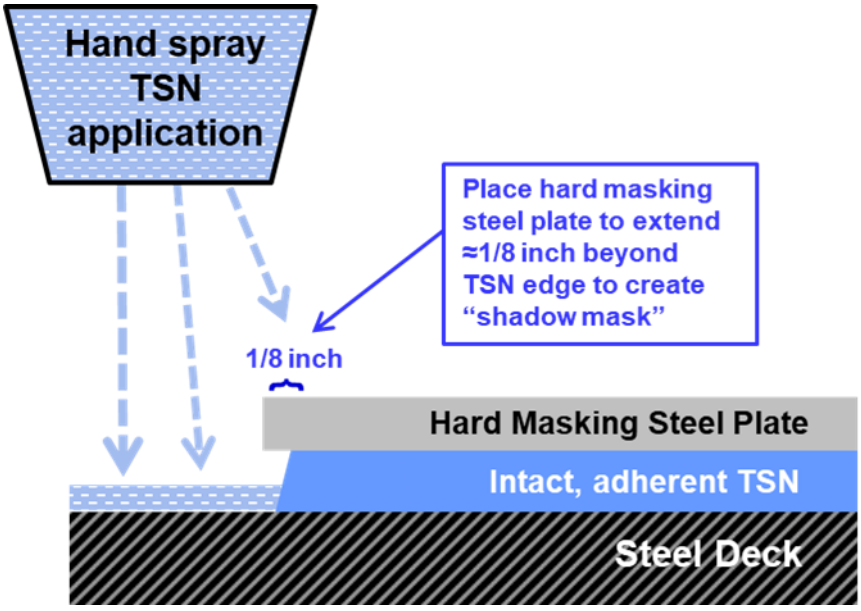


Figure C-5: Cross section view of shadow mask for first layer of TSN

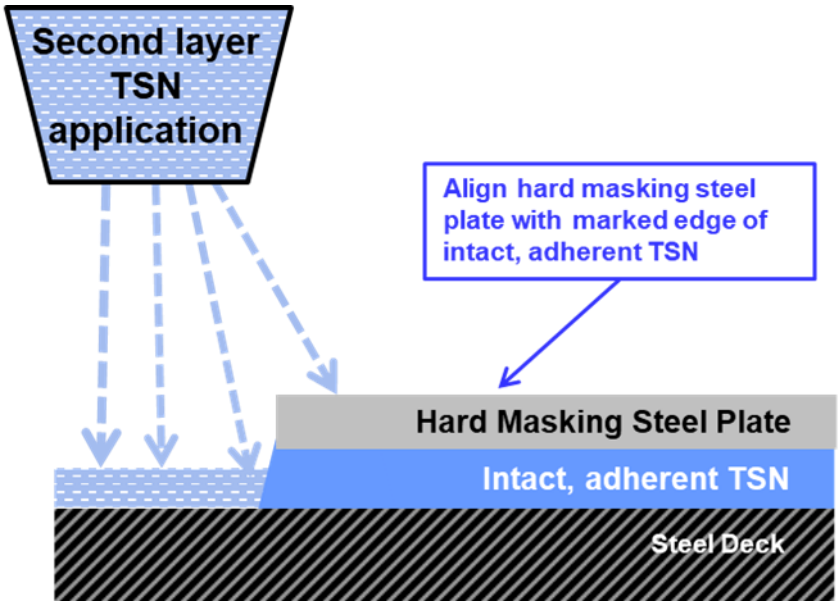


Figure C-6: Cross section view of masking alignment for second layer of TSN

ATTACHMENT D

Repair Procedure for Less Than 20 Square Foot Areas of TSN that Requires Removal by Hand and Power Tools and TSN Installation Using TSN Hand Spray Application Equipment

1. The repair areas must be designated and marked by the NAVSEA-approved Technical Representative.

2. As directed by the SUPERVISOR, remove TSN from designated repair areas using rotary cutting tools and hand tools. Hand sand TSN edges around repair areas using 80 – 120 grit paper or equivalent abrasive pad to remove sharp burrs or slivers along the edge of retained TSN.

3. In-process records must be recorded and maintained on Repair QA Checklist Form, Appendix B for each repair area.

4. One legible copy of Repair QA Checklist Form Appendices must submitted to the SUPERVISOR within 24 hours of completion of TSN removal in each repair location listed in the invoking Work Item or task order.

5. Solvent clean the exposed substrate and retained TSN surfaces surrounding each repair area to an SSPC-SP 1 cleanliness to remove chloride and hydrocarbon contamination. Solvent clean between one and two inches of retained TSN around the entire perimeter of each repair area.

6. Measure and document the conductivity of each repair area in accordance with paragraph 3.13.3 on Repair QA Checklist Form, Appendix B.

7. Verify each repair area is free of contaminants in accordance with paragraph 3.13.4 and document the results on Repair QA Checklist Form, Appendix B.

8. Install steel masking plates around the edges of the repair area in accordance with Figures D-1 and D-2. The masking plates must be between 1/16-inch and 1/8-inch thick, a minimum of 6 inches wide, and placed along the edge of the repair in a manner such that some part of the plate is in direct contact with the deck in accordance with Figure D-2.

    a. Steel masking plates must be aligned with the repair edge as shown in Figure D-1.

    b. In repair areas with edges that are not straight, no more than 1/2 inches of retained TSN must be visible between any hard steel masking plate and the exposed steel in the TSN repair area.

9. Accomplish the QA checkpoints in accordance with 3.13.2, 3.13.3, 3.13.4 and document the results on Repair QA Checklist Form, Appendix B.

10. In accordance with Table One, Line 4, Column B, Abrasive blast the repair area in accordance with paragraph 3.14 and conduct QA checkpoints in accordance with paragraph 3.14. Remove steel masking plates and visually inspect the repair area, including the edge of adjacent, adherent, retained TSN, to verify NACE 1/SSPC-SP 5 of 2.3. Document the results on Repair QA Checklist Form, Appendix B.

11. Install steel masking plates along the repair area for application of the first layer of TSN.

    a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

    b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure D-2. Align steel masking plates to extend 1/8 inch beyond the retained TSN edge to create a "shadow mask" in accordance with Figure D-3. Steel masking plates extending less than 1/16 inch beyond the retained TSN edge or greater than 3/16 inch beyond the retained TSN edge must be re-positioned in accordance with Figure D-3 before TSN spray application.

12. In accordance with Table One, Line 4, Column C, accomplish hand spray application of first layer of TSN and QA checkpoints in accordance with paragraph 3.15. Measure the FT of the first layer in accordance with paragraph 3.6 except that three spot measurements must be made for each repair area. Document the results on Repair QA Checklist Form, Appendix B.

13. Install steel masking plates for the second layer of TSN in accordance with Figure D-4.

    a. Install steel masking plates to protect the retained TSN edge from TSN installation overspray.

    b. Place the steel masking plates along the edge of the repair area such that some part of the plate is in direct contact with the deck in accordance with Figure D-2. Align steel masking plates with the retained TSN edge in accordance with Figure D-4.

14. In accordance with Table One, Line 3, Column D, accomplish hand spray application of second layer of TSN and document QA checkpoints in accordance with paragraph 3.15. Measure the FT of the second layer in accordance with paragraph 3.6 except that three spot measurements must be made for each repair area. Record the FT results on Repair QA Checklist Form, Appendix B.

15. Remove steel masking plates and in accordance with Table One. Line 3, Column E, clean TSN repair area and document cleaning in accordance with paragraph 3.16 on Repair QA Checklist Form, Appendix B.

16. In accordance with Table One, Line 3, Column F, apply sealer to TSN in the repair area in accordance with paragraph 3.17 and document sealing on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of sealer onto areas of retained TSN must not exceed 1/2 inch.

17. In accordance with Table One, Line 3, Column G, apply dark gray color top to TSN in the repair area in accordance with paragraph 3.18 and document top coat application on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of dark gray onto areas of retained TSN must not exceed 1/2 inch.

18. In accordance with Table One, Line 3, Column H, apply VLA marking color top to TSN in the repair area in accordance with paragraph 3.19 and document VLA marking color top application on QA Checklist Form, Appendix 6 of 009-32 of 2.1.

    a. Overlap of VLA Marking colors onto areas of retained TSN must not exceed 1/2 inch.

    b. Overlap of VLA Marking colors on dark gray color top must not exceed 1/2 inch.

19. Accomplish MIL-PRF-24667 nonskid system application to tie in areas, deck tie-down fittings, areas around recessed flight deck lights, and to areas around other designated deck fittings in accordance with 009-32 of 2.1.

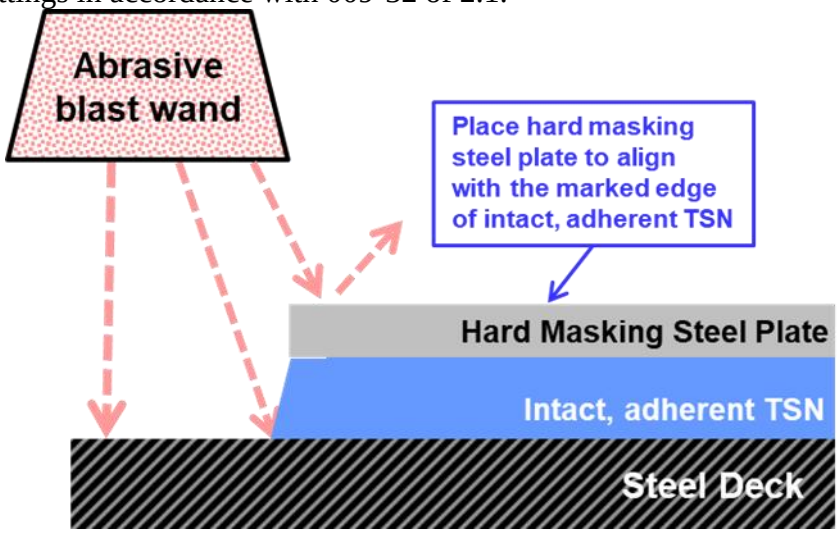


Figure D-1: Cross section view of masking alignment for abrasive blasting

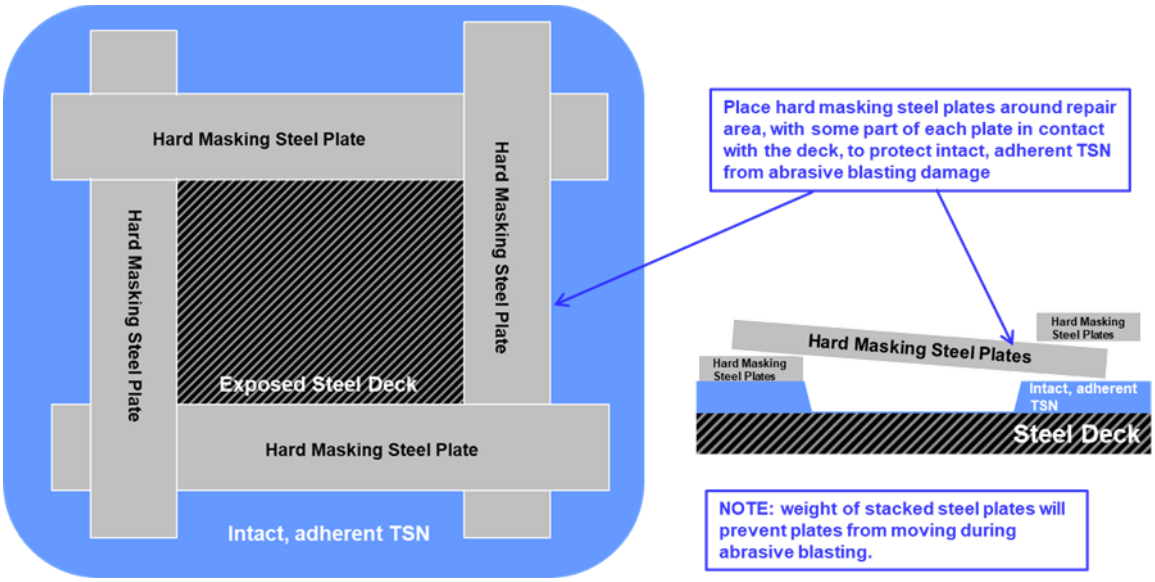


Figure D-2: Example of hard masking plate configuration around repair area

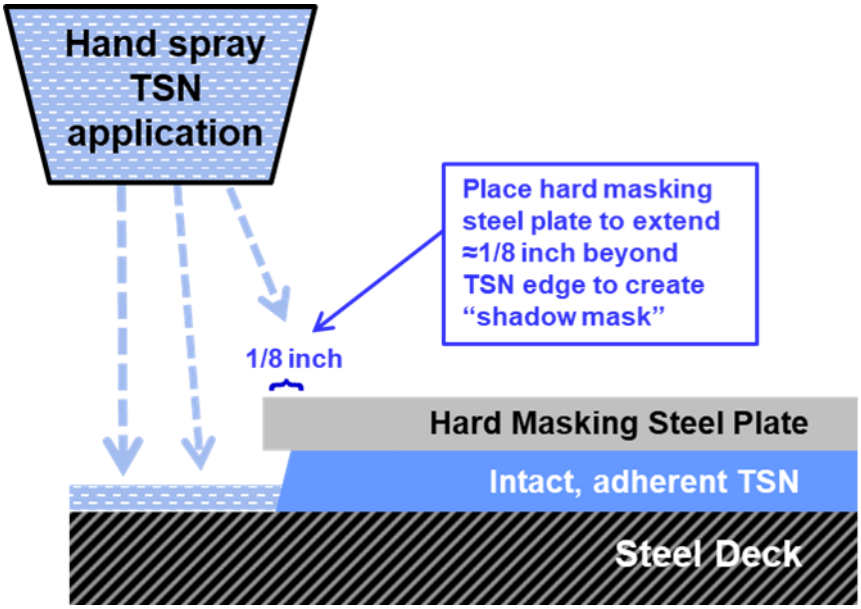


Figure D-3: Cross section view of shadow mask for first layer of TSN

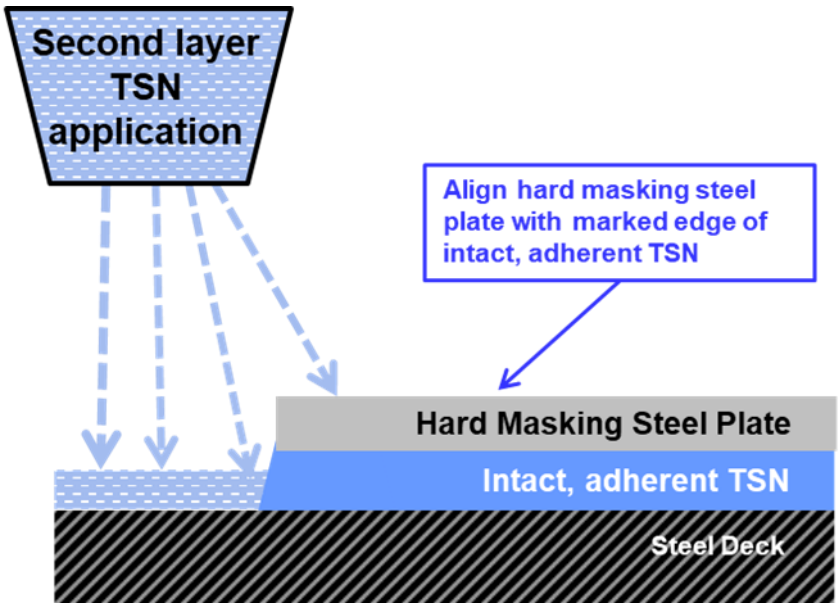
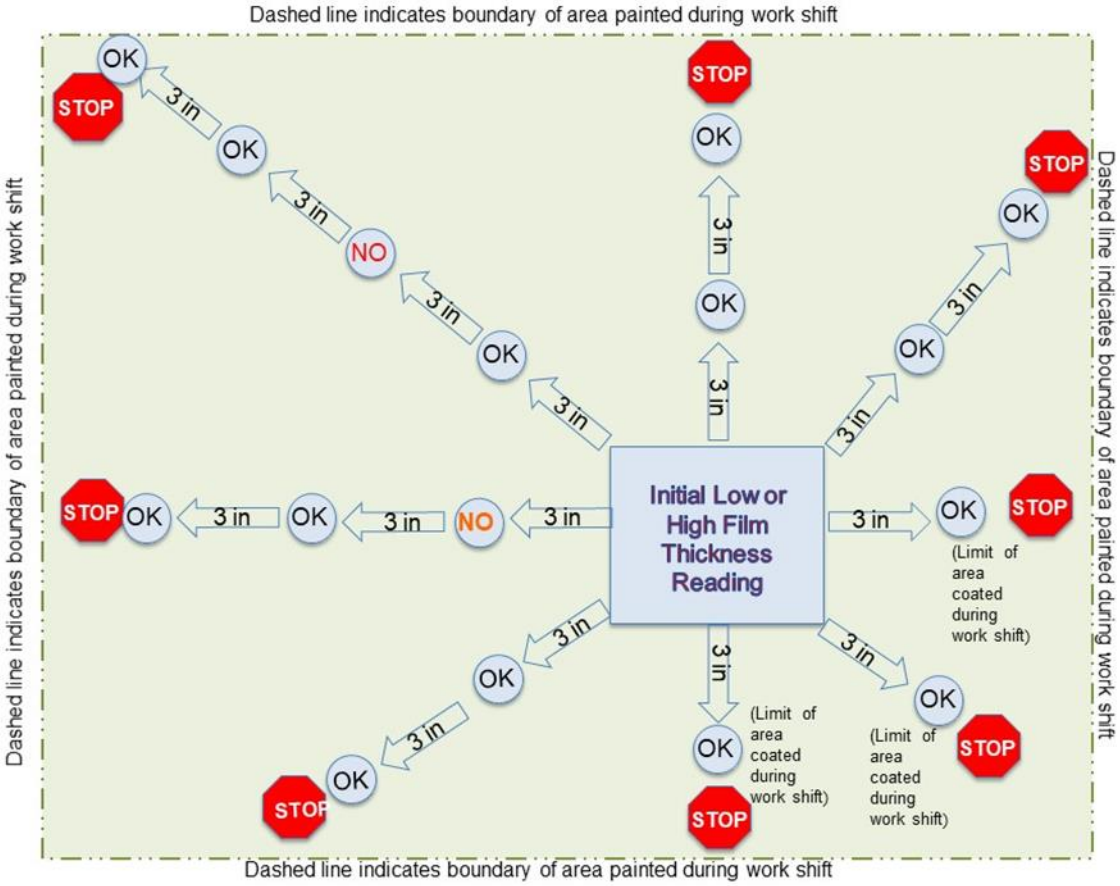


Figure D-4: Cross section view of masking alignment for second layer of TSN

ATTACHMENT E

Determination of Boundary Area with Low or High Film Thickness



NOTES FOR TABLE ONE

1. The specific areas to be repaired must be defined and marked by the SUPERVISOR.

2. Refer to Attachment B for repair procedures of areas greater than 200 square feet.

3. Apply sealer to TSN in repair areas. Overlap of sealer onto surrounding TSN color topping must not exceed 1/2 inch.

4. Refer to Attachment C for repair procedures for areas between 20 – and 200 square feet.

5. Intentionally left blank.

6. Refer to Attachment D for repair procedures of areas less than 20 square feet.

TABLE ONE: SURFACE PREPARATION AND COATING SYSTEM

TABLE ONE STEEL SURFACES	LINE	A PRIMARY SURFACE PREPARATION	B SECONDARY SURFACE PREPARATION	C TSN FIRST LAYER	D TSN SECOND LAYER	E SURFACE CLEANING	F TSN COLOR TOP SYSTEM SEALER	G TSN COLOR TOP SYSTEM TOP COAT	H VLA MARKING
FLIGHT DECKS - NEW INSTALL IN WORK ZONE	1	WATERJET TO NACE/SSPC-SP WJ-2/L	WHITE METAL BLAST TO NACE 1/SSPC-SP 5, 4-10 MIL PROFILE	MIL-PRF-32577 IN ACCORDANCE WITH 2.2, FIRST LAYER 25 MIL FT MINIMUM	MIL-PRF-32577 IN ACCORDANCE WITH 2.2, TOTAL SYSTEM 45 MIL FT MINIMUM	BRUSH/BROOM OR WATER CLEANING IN ACCORDANCE WITH 3.16	APPLY SEALER AND BACK ROLL IN ACCORDANCE WITH ASTM F718	FIRST COAT DECK GRAY 2-3 MILS WFT IF REQUIRED FOR HIDING, ONE ADDITIONAL COAT MUST BE APPLIED	FIRST COAT 2-3 MILS WFT IF REQUIRED FOR HIDING, ONE ADDITIONAL COAT MUST BE APPLIED

FLIGHT DECKS - REPAIR OF INSTALLED TSN BY HP WJ AND TSN ROBOTIC SPRAY EQUIPMENT AREAS GREATER THAN 200 SQUARE FEET SEE NOTES (1) & (2)	2	WATERJET TO NACE/SSPC-SP WJ-2/L	WHITE METAL BLAST TO NACE 1/SSPC-SP 5, 4-10 MIL PROFILE	MIL-PRF-32577 IN ACCORDANCE WITH 2.2, FIRST LAYER 25 MIL FT MINIMUM	MIL-PRF-32577 IN ACCORDANCE WITH 2.2, TOTAL SYSTEM 45 MIL FT MINIMUM	BRUSH/BROOM OR WATER CLEANING IN ACCORDANCE WITH 3.16	APPLY SEALER AND BACK ROLL IN ACCORDANCE WITH ASTM F718 SEE NOTE (3)	FIRST COAT DECK GRAY 2-3 MILS WFT IF REQUIRED FOR HIDING, ONE ADDITIONAL COAT MUST BE APPLIED	FIRST COAT 2-3 MILS WFT IF REQUIRED FOR HIDING, ONE ADDITIONAL COAT MUST BE APPLIED
FLIGHT DECKS- REPAIR OF INSTALLED TSN BY HP WJ AND TSN HAND SPRAY EQUIPMENT AREAS BETWEEN 20 SQUARE FEET AND 200 SQUARE FEET SEE NOTE (1)&(4)	3	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 1	MIL-PRF-32577 IN ACCORDANCE WITH 2.2, TOTAL SYSTEM 45 MIL FT MINIMUM	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 1

FLIGHT DECKS - REPAIR OF INSTALLED TSN BY HAND AND POWER TOOLS AND TSN HAND SPRAY EQUIPMENT AREAS LESS THAN 20 SQUARE FEET SEE NOTES (6) |	4	SSPC-SP 1	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 3	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 1	SAME AS LINE 1

Appendix A - Thermal Spray QA Checklist Form

Ship Name & Hull #:	Contract/Task Order/CLIN/TWD:
Date:	Work Item:_____ Para. No._____
Product being Applied:	Location / Size (FT^2)_____
Req't Document:_____/FY:_____ Table:_____ Line:_____ Column:_____	
MAINTAIN SEPARATE LOG FOR EACH AREA/LOCATION PREPARED AND COATED DAILY. WHEN AND AREA IS DIVIDED INTO SEPARATE SECTION, MAINTAIN A SEPARATE LOG FOR EACH SECTION	
NOTE #1: For any UNSAT condition found, provide the technical adjudication and correct action taken in the comments block.	
NOTE #2 If spaces are not applicable, insert N/A. Unused sections must be crossed out and marked N/A	
(V) Primary Surface Preparation (NACE SSPC-SP WJ2/L);	Visual SAT : ☐ UNSAT: ☐
Contractor (Print):_____(Signature):_____Date/Time:_____	

(I) (G) Conductivity: (<30µs/cm) One for first 200 ft^2 - One for each additional 400 ft^2

#	Conductivity (µs/cm)	SAT	UNSAT
1			
2			
3			
4			
5			

Condition of Checkpoint SAT: ☐ UNSAT: ☐

Contractor (Print):_____(Signature):_____Date/ Time:_____

Subcontractor (Print):_____(Signature):_____Date/Time:_____

Gov't Insp. (Print):_____(Signature):_____Date/Time:_____

(I) (G) Cleanliness Prior to Abrasive Blasting (SSPC-SP 1)	Visual SAT: ☐ UNSAT: ☐
Water Break Test: Min. one per 200 FT^2	SAT: ☐ UNSAT: ☐

Contractor (Print):_____(Signature):_____Date/Time:_____

Subcontractor (Print):_____(Signature):_____Date/Time:_____

Gov't Insp. (Print):_____(Signature):_____Date/Time:_____

(V) Verify Compressed Air Quality	SAT: ☐ UNSAT: ☐

Contractor (Print):_____ (Signature):_____Date/Time:_____

(I) (G) Secondary Surface Preparation (SSPC-SP 5)	Visual SAT: ☐ UNSAT: ☐
(I) (G) Surface Profile	SAT: ☐ UNSAT: ☐

Surface Texture: RΔq Minimum .45. One for every 400ft^2 - One measurement = mean of 5 individual readings

#	Individual Readings (RΔq)					AVG.
1						
2						
3						
4						
5						

Surface Profile: (Method B) 4-10 mils. Two for every 100ft^2. One measurement = mean of 10 individual gage readings. Each avg. recorded.

#	Individual Readings (mils)										AVG.
1											
2											
3											
4											
5											

Contractor (Print):_____ (Signature):_____ Date/Time:_____

Subcontractor (Print):_____ (Signature):_____Date/ Time:_____

Gov't Insp. (Print):_____ (Signature):_____Date/Time:_____

NOTES:

(I) (G) Dust Tape: Three for each 400ft^2. Minimum Rating 2 / Class 2. Attach specimens to the backside of this form.

Adhesive Tape Type_____

#			Condition of Checkpoint
1			
2			SAT: ☐ UNSAT: ☐
3			
4			
5			

Contractor (Print):_____ (Signature):_____ Date/Time:_____

Subcontractor (Print):_____ (Signature):_____Date/ Time:_____

Gov't Insp. (Print):_____ (Signature):_____Date/Time:_____

<table>
<tr><td>(V) Verify Secondary Surface Preparation Prior to TSN Application</td><td>Visual SAT: ☐ UNSAT: ☐</td></tr>
<tr><td colspan="2">Contractor(Print):_____(Signature):_____Date/Time:_____</td></tr>
<tr><td>(V) Thermal Spray Application Machine Settings: Verify machine settings are in accordance with qualified procedure in 2.2</td><td>SAT: ☐ UNSAT: ☐</td></tr>
<tr><td>Start and Stop Times (each layer)</td><td><table><tr><td>Start/Stop First Layer</td><td>Start/Stop Second Layer</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>Product Information</td><td>Manufacturer:_____
Batch Number(s)_____
Expiration Date(s):_____</td></tr>
<tr><td colspan="2">Contractor(Print):_____(Signature):_____Date/Time:_____</td></tr>
<tr><td>(V) Mandrel Bend Witness Coupons: Three for the total area coated</td><td><table><tr><td>Coupon #</td><td>Profile</td><td>FT</td><td>Bend SAT</td><td>Bend UNSAT</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td colspan="2">Contractor (Print):_____(Signature):_____Date/Time:_____</td></tr>
<tr><td>(V) Thermal Spray Visual Inspection (no cracks, delamination, irregularities)</td><td>SAT: ☐ UNSAT: ☐</td></tr>
<tr><td colspan="2">Contractor(Print):_____(Signature):_____Date/Time:_____</td></tr>
</table>

(I) (G) Film Thickness Measurements 5 Spot measurements per 200ft2. One spot measurement = the average of 10 individual gage readings made along a 24" straight line perpendicular to application direction

Condition of Checkpoint

SAT ☐ UNSAT ☐

#	Individual Readings (mils)										AVG
1											
2											
3											
4											
5											
#	Individual Readings (mils)										AVG
1											
2											
3											
4											
5											
#	Individual Readings (mils)										AVG
1											
2											
3											
4											
5											

Contractor (Print):_____ (Signature):_____ Date/Time:_____

Subcontractor (Print):_____ (Signature):_____Date/ Time:_____

Gov't Insp. (Print):_____ (Signature):_____Date/Time:_____

(V) Environmental Readings: Data Logger Used: Yes No

Activity	Date/Time	Air Temp. (F)	Surface Temp. (F)	Dewpoint (F)	Relative Humidity (%RH)

Gage / Instrument Information:

Gage Type	Gage #	Calibration Due Date

Comments

Appendix B - Thermal Spray Repair QA Checklist Form

Ship/Hull No.: ITEM NO:			Date:		
Location:		Repair Area No.:		Dimensions:	

Environmental			
Substrate (F°)	Humidity (%)	Ambient (F°)	Dew Point (F°)

Surface Cleanliness - Conductivity

Water Break tests must be performed on any spots that visually indicate hydrocarbon contamination.

Conductivity: Take one conductivity measurement for every area that is planned to be blasted for the same production day. Conductivity readings must not exceed 30 micro-siemens/cm.

Time	Conductivity Reading (µS/cm)	SSPC-SP 1/Water Break

Indicate and Verify Primary Surface Preparation:
WJ-2 (22,000 – 25,000 PSI) / Power and Hand Tool
Results of TSN Removal: SAT / UNSAT
Compressed Air Quality (Blotter Test): SAT / UNSAT
Inspect surface for SSPC-SP 5 conformance.: SAT / UNSAT

Surface Profiles

Reading	ASTM D4417 Method B	Stylus Profilometer		
	4.0-10 Mil	>0.45		
	Height (mil)	RΔq		
1				
2				
3				
4				
5				
Avg				

FT Readings			
	1	2	3
1st Layer			
2nd Layer			
Wire Type:			
Lot#:			

Dust Test: SAT / UNSAT
Machine Settings: SAT / UNSAT
Mandrel Bend Test: SAT / UNSAT
FT and Results: SAT / UNSAT

Notes:

Contractor(Print):	_____	(Signature):	_____	Date:	_____
Subcontractor(Print):	_____	(Signature):	_____	Date:	_____
Gov't Insp.(Print):	_____	(Signature):	_____	Date:	_____