INCREMENTAL CHANGE Release Notification Date: 01/13/2023

SPM 70-21-07 CLEANING METHOD NO. 7 - THREE-STEP HEAVY-DUTY ALKALINE DESCALING (WITHOUT INHIBITED PHOSPHORIC ACID)

DISCLAIMER

The Incremental Changes published by GE Aviation are considered Instructions for Continued Airworthiness. These Incremental Changes, along with the current Manual revision and published Temporary Revisions, constitute the latest Instructions for Continued Airworthiness.

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HIGHLIGHTS

HIGHLIGHT REFERENCE	DESCRIPTION OF CHANGE
tk70-21-07-110-802	Technical Change: Changed CAUTION and NOTE for the procedure.
sk70-21-07-110-053	Technical Change: Added seal teeth aluminum oxide topcoat to the procedure.

TASK 70-21-07-110-802

1. General.

CAUTION: DO NOT APPLY THIS PROCESS ON ALUMINUM, TITANIUM, AND THEIR ALLOYS, ON CHROMIUM-PLATED PARTS OR LOW ALLOY STEELS WITH LESS THAN 10 PERCENT CHROMIUM.

CAUTION: MASKING OF THERMAL SPRAY WEAR COATINGS INCLUDING T400, T800, TUNGSTEN CARBIDE/COBALT, CHROME CARBIDE/NICKEL CHROME, AND SEAL TEETH ALUMINUM OXIDE TOPCOAT ARE NECESSARY FOR THIS CLEANING PROCESS UNLESS OTHERWISE SPECIFIED IN THE APPLICABLE REPAIR DOCUMENT.

NOTE: If the thermal spray wear coat and seal teeth aluminum oxide topcoat will be stripped and replaced before the part is returned to service, then the masking is not necessary.

NOTE: Thermal spray coatings have a dull gray color while chrome plating has a shiny and lighter color. If FPI is used, a thermal spray coated bearing journal will have an even background glow, while a chrome plate will have the characteristic network cracking pattern.

NOTE: Ultrasonic agitation of the solution(s) can be used to increase the efficiency. Refer to Subtask 70-21-07-110-539 for process details.

A. This cleaning method is a multiple hot-tank process that is effective in removing heat scale and oxide formations from high-temperature alloy jet engine parts.

B. Unless specified differently, Method No. 2 (TASK 70-21-07-110-801) can be used as an alternative to Method No. 1 (TASK 70-21-07-110-005).

TASK 70-21-07-110-005

1. General - Method No. 1.

Subtask 70-21-07-110-055

A. When you do this procedure (Method No. 1), you must also obey the instructions in TASK 70-21-07-110-802, Cleaning Method No. 7 Three-Step Heavy-Duty Alkaline Descaling (Without Inhibited Phosphoric Acid).

2. Equipment.

Subtask 70-21-07-110-051

A. The following equipment is required for the application of this process.

(1) Safety equipment and devices which are standard equipment in surface treatment shops such as: eye bath, emergency showers, protective clothing against electroplating products and means for neutralizing acid or alkaline splashing.

(2) Processing plant for neutralizing waste and used solutions.

(3) Efficient ventilation system for extracting and neutralizing vapors.

(4) An alkaline degreasing tank made from stainless steel with a heating coil that is capable of heating the solution to 200°F (93°C).

(5) A water rinse tank made from stainless steel (or a carbon steel tank with a polypropylene lining) and a water spray gun, used after the degreasing bath.

(6) An alkaline stripping tank made from stainless steel with a heating coil that is capable of heating the solution to 260°F (127°C).

(7) A water rinse tank made from stainless steel (or a carbon steel tank with a polypropylene lining) and a water spray gun, used after the alkaline stripping.

(8) A permanganate cleaning tank made from stainless steel with a heating coil that is capable of heating the solution to at least 180°F (82°C).

(9) A water rinse tank made from stainless steel (or a carbon steel tank with a polypropylene lining) and a water spray gun that are used after the alkaline permanganate bath.

(10) A hot water rinse tank made from stainless steel (or a carbon steel tank with polypropylene lining) that can increase the temperature of the solution to 200°F (93°C).

3. Materials.

Subtask 70-21-07-110-052

Alkaline Degreasing/Rust Removing Solution - Table 1

Solution	No.	Operating Temperature °F (°C)
Ardrox 185 or Ardrox 185L	S1024	180-200 (82-93)
Turco 4181, Turco 4181-L or Turco 4181-GL	S1006	180-200 (82-93)
MagChem HDP-2888	S1017	180-200 (82-93)
Cee-Bee J-84A or Cee-Bee J-84AL	S1026	180-200 (82-93)
MagChem HDL-202	S1150	180-200 (82-93)
Eldorado HTP-1150	S1161	180-200 (82-93)
Eldorado HTP-1150L	S1162	180-200 (82-93)
Applied 5-840	S1176	180-200 (82-93)

Alkaline Stripping Solution for Stainless Steel and Heat-Resistant Alloys - Table 2

Solution	No.	Operating Temperature °F (°C)
Turco 4008	S1038	270-280 (132-138)

Alkaline Permanganate Solution - Table 3

Solution	No.	Operating Temperature °F (°C)
Turco 4338 or Turco 4338-L or Turco 4338-C	S1012	160-200 (71-93)
Ardrox 188 or Ardrox 188RFU	S1001	160-200 (71-93)
Alkaline permanganate	S1004	160-200 (71-93)
MagChem HDP-2524	S1018	160-200 (71-93)
Cee-Bee J-88 or Cee-Bee J-88L	S1014	160-200 (71-93)
Eldorado HTP 1190	S1163	160-200 (71-93)
Eldorado HTP 1190L	S1164	160-200 (71-93)
Applied 5-770	S1177	180-200 (82-93)
MagChem HDL-2524	S1203	160-200 (71-93)
Ardrox 1435	S1205	160-200 (71-93)

NOTE: Operating the alkaline permanganate solution in the low end of the temperature range will extend the bath life but may decrease effectiveness. Conversely, operating the batch at the high end of the temperature range will improve cleaning ability at the risk of decreasing bath life and increasing the frequency of de-sludging.

4. Procedure.

Subtask 70-21-07-110-053

CAUTION: IN CASE OF INSUFFICIENT DESCALING, DO NOT PROLONG THE IMMERSION BEYOND THE DURATION SPECIFIED, BUT REPEAT THE COMPLETE CYCLE.

A. In case of excessive dirt, pre-clean the part. Refer to TASK 70-21-01-110-001, Cleaning Method No. 1 - Solvent Degreasing or TASK 70-21-22-110-042, Cleaning Method No. 22 Light Duty Aqueous Cleaning.

B. Apply masking to all areas that have thermal spray wear coatings including T400, T800, tungsten carbide/cobalt, chrome carbide/nickel chrome, and seal teeth aluminum oxide topcoat. Refer to TASK 70-18-01-330-801 (70-18-01, Masking Method No. 1 - Masking With Chemical Maskant) unless otherwise stated in the service document.

NOTE: Unless specified differently, TASK 70-21-04-120-E01 (70-21-04, Cleaning Method No. 4 - Dry

Abrasive Blast Cleaning), can be used to increase the cleaning efficiency and remove contaminates before the chemical cleaning process.

WARNING: ALKALINE SOLUTIONS ARE VERY ACTIVE AND CAUSE SERIOUS BURNS. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. IF CONTACT OCCURS, WASH IMMEDIATELY WITH ABUNDANT QUANTITY OF WATER. AVOID BREATHING VAPORS.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

C. Immerse the part in a tank containing one of the alkaline solutions listed in Table 1 or Table 2 and maintain the solution at the specified temperature. The alkaline solutions are listed in Subtask 70-21-07-110-052, Materials.
Duration: 15 to 60 minutes.

D. Rinse by spraying with a water jet and by immersion in water at room temperature.

WARNING: ALKALINE SOLUTIONS ARE VERY ACTIVE AND CAUSE SERIOUS BURNS. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. IF CONTACT OCCURS, WASH IMMEDIATELY WITH ABUNDANT QUANTITY OF WATER. AVOID BREATHING VAPORS.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

E. Immerse the part in a tank containing one of the alkaline permanganate solutions listed in Table 3 and maintain the solution at the specified temperature. The alkaline permanganate solutions are listed in Subtask 70-21-07-110-052, Materials.
Duration: 30 to 60 minutes.

F. Rinse by spraying with a water jet and by immersion in water at room temperature.

WARNING: ALKALINE SOLUTIONS ARE VERY ACTIVE AND CAUSE SERIOUS BURNS. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. IF CONTACT OCCURS, WASH IMMEDIATELY WITH ABUNDANT QUANTITY OF WATER. AVOID BREATHING VAPORS.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

G. Immerse the part in a tank containing one of the alkaline solutions listed in Table 1 or Table 2 and maintain the solutions at the specified temperature. The alkaline solutions are listed in Subtask 70-21-07-110-052, Materials.
Duration: 30 to 60 minutes.

H. Rinse by spraying with a water jet and by immersion in water at room temperature.

I. Rinse by immersion in hot water at minimum 150ºF (66ºC).

WARNING: ALL CHEMICALS MUST BE COMPLETELY REMOVED WITH RINSING TO PREVENT CORROSION.

WARNING: WHEN USING COMPRESSED AIR FOR CLEANING, COOLING, OR DRYING, DO NOT EXCEED 30 PSIG (207 KPA). WEAR EYE PROTECTION AND DO NOT DIRECT COMPRESSED AIR AT SELF OR OTHERS.

CAUTION: PARTS MUST BE THOROUGHLY DRY PRIOR TO FPI INSPECTION. WATER ON THE PARTS MAY DEGRADE THE SENSITIVITY OF THE PROCESS, ESPECIALLY FOR THE WATER WASHABLE PENETRANT PROCESS.

J. Dry the part by one of the following two methods.
(1) Flash dry the part as follows:
(a) Keep the part submerged until the part reaches a temperature sufficient to provide for flash drying.
NOTE: The time required will vary with part size, water temperature and tank size. Proper flash drying is indicated by seeing the water on the surface of a part start to "flash" or "whisk" off as the part is being removed from the hot water tank.
(b) Remove the part from the water. The part will flash dry as soon as it is removed from the water. Use repositioning, suction, blotting with a clean, absorbent material, or by blowing off with an oil and water filtered shop air gun to remove excess water.
(2) You can substitute drying the part in an air re-circulating oven for the dwell time in the hot water.
(a) Remove the part from the water. You can remove excess water by repositioning, suction, blotting with a clean absorbent material, or blowing the water off with an oil and water filtered shop air gun.
(b) Move the part to the oven and dry at 200°F ± 25°F (93°C ± 14°C) until the part reaches the oven temperature and all traces of surface water are removed.

5. Quality Assurance.

Subtask 70-21-07-110-054

A. Visually check for removal of all traces of oxide on the part.

B. If oxides are still present on the part after this cleaning, refer to TASK 70-21-04-120-E01, Dry Abrasive Blast Cleaning - Method No. 4E, to remove the contaminants.

TASK 70-21-07-110-801

1. General - Method No. 2.

Subtask 70-21-07-110-056

A. When you do this procedure (Method No. 2), you must also obey the instructions in TASK 70-21-07-110-802, Cleaning Method No. 7 Three-Step Heavy-Duty Alkaline Descaling (Without Inhibited Phosphoric Acid).

2. Equipment.

Subtask 70-21-07-110-057

A. The following equipment is required for the application of this process:
(1) Safety equipment and devices which are standard equipment in surface treatment shops such as: eye bath, emergency showers, protective clothing against electroplating products, and means for neutralizing acid or alkaline splashing.
(2) Processing plant for neutralizing waste and used solutions.
(3) Efficient ventilation system for extracting and neutralizing vapors.
(4) A neutral deoxidizer tank made from stainless steel with a heating coil that is capable of heating the solution to 200°F (93°C).

(5) A water rinse tank made from stainless steel (or a carbon steel tank with a polypropylene lining) and a water spray gun, used after the degreasing bath.
(6) A permanganate cleaning tank made from stainless steel with a heating coil that is capable of heating the solution to at least 180°F (82°C).
(7) A water rinse tank made from stainless steel (or a carbon steel tank with a polypropylene lining) and a water spray gun that are used after the alkaline permanganate bath.
(8) A hot water rinse tank made from stainless steel (or a carbon steel tank with polypropylene lining) that can increase the temperature of the solution to 200°F (93°C).

3. Materials.

Subtask 70-21-07-110-058

Neutral Deoxidizing/Rust Removing Solution - Table 1

Solution	No.	Operating Temperature °F (°C)
Neutral deoxidizer	S1208	170-190 (77-88)

Alkaline Permanganate Solution - Table 2

Solution	No.	Operating Temperature °F (°C)
Turco 4338 or Turco 4338-L or Turco 4338-C	S1012	160-200 (71-93)
Ardrox 188 or Ardrox 188RFU	S1001	160-200 (71-93)
Alkaline permanganate	S1004	160-200 (71-93)
MagChem HDP-2524	S1018	160-200 (71-93)
Cee-Bee J-88 or Cee-Bee J-88L	S1014	160-200 (71-93)
Eldorado HTP 1190	S1163	160-200 (71-93)
Eldorado HTP 1190L	S1164	160-200 (71-93)
Applied 5-770	S1177	180-200 (82-93)
MagChem HDL-2524	S1203	160-200 (71-93)
Ardrox 1435	S1205	160-200 (71-93)

NOTE: Operating the alkaline permanganate solution in the low end of the temperature range will extend the bath life but may decrease effectiveness. Conversely, operating the bath at the high end of the temperature range will improve cleaning ability at the risk of decreasing bath life and increasing the frequency of de-sludging.

4. Procedure.

Subtask 70-21-07-110-059

CAUTION: IN CASE OF INSUFFICIENT DESCALING, DO NOT PROLONG THE IMMERSION BEYOND THE DURATION SPECIFIED, BUT REPEAT THE COMPLETE CYCLE.

A. In case of excessive dirt, pre-clean the part. Refer to TASK 70-21-01-110-001, Cleaning Method No. 1 - Solvent Degreasing or TASK 70-21-22-110-042, Cleaning Method No. 22 Light Duty Aqueous Cleaning.
B. Mask all areas that have thermal spray wear coatings including T400, T800, tungsten carbide/cobalt, and chrome carbide/nickel chrome. Refer to TASK 70-18-01-330-801 Masking Method No. 1 - Masking With Chemical Maskant, unless otherwise stated in the service document.

NOTE: Unless specified differently, TASK 70-21-04-120-E01 (70-21-04, Cleaning Method No. 4 - Dry Abrasive Blast Cleaning), can be used to increase the cleaning efficiency and remove contaminates before the chemical cleaning process.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

C. If there is coke or baked-on carbon on the part, do these steps:
(1) Immerse the part in a tank containing one of the alkaline solutions listed in Table 1 and maintain the solution at the specified temperature. The alkaline solutions are listed in Subtask 70-21-07-110-052, Materials (Method No. 1).
Duration: 15 to 30 minutes.
(2) Rinse by spraying with a water jet and by immersion in water at room temperature.
D. Immerse the part in a tank containing neutral deoxidizer solutions listed in Table 1 and maintain the solution at the specified temperature. The neutral deoxidizer solutions are listed in Subtask 70-21-07-110-058, Materials.
Duration: 15 to 30 minutes.
E. Rinse by spraying with a water jet and by immersion in water at room temperature.

WARNING: ALKALINE SOLUTIONS ARE VERY ACTIVE AND CAUSE SERIOUS BURNS. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. IF CONTACT OCCURS, WASH IMMEDIATELY WITH ABUNDANT QUANTITY OF WATER. AVOID BREATHING VAPORS.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

F. Immerse the part in a tank containing one of the alkaline permanganate solutions listed in Table 2 and maintain the solution at the specified temperature. The alkaline permanganate solutions are listed in Subtask 70-21-07-110-058, Materials.
Duration: 15 to 60 minutes.
G. Rinse by spraying with a water jet and by immersion in water at room temperature.
H. Immerse the part in a tank containing neutral deoxidizer solutions listed in Table 1 and maintain the solution at the specified temperature. The neutral deoxidizer solutions are listed in Subtask 70-21-07-110-058, Materials.
Duration: 15 to 30 minutes.
I. Rinse by spraying with a water jet and by immersion in water at room temperature.

J. Rinse by immersion in hot water at minimum 150ºF (66ºC).

WARNING: WHEN USING COMPRESSED AIR FOR CLEANING, COOLING, OR DRYING, DO NOT EXCEED 30 PSIG (207 KPA). WEAR EYE PROTECTION AND DO NOT DIRECT COMPRESSED AIR AT SELF OR OTHERS.

CAUTION: PARTS MUST BE THOROUGHLY DRY PRIOR TO FPI INSPECTION. WATER ON THE PARTS MAY DEGRADE THE SENSITIVITY OF THE PROCESS, ESPECIALLY FOR THE WATER WASHABLE PENETRANT PROCESS.

K. Dry the part by one of the following two methods:

(1) Flash dry the part as follows:

(a) Keep the part submerged until the part reaches a temperature sufficient to provide for flash drying.

NOTE: The time required will vary with part size, water temperature and tank size. Proper flash drying is indicated by seeing the water on the surface of a part start to "flash" or "whisk" off as the part is being removed from the hot water tank.

(b) Remove the part from the water. The part will flash dry as soon as it is removed from the water. Use repositioning, suction, blotting with a clean, absorbent material, or by blowing off with an oil and water filtered shop air gun to remove excess water.

(2) You can substitute drying the part in an air re-circulating oven for the dwell time in the hot water.

(a) Remove the part from the water. You can remove excess water by repositioning, suction, blotting with a clean absorbent material, or blowing the water off with an oil and water filtered shop air gun.

(b) Move the part to the oven and dry at 200°F ± 25°F (93°C ± 14°C) until the part reaches the oven temperature and all traces of surface water are removed.

5. Quality Assurance.

Subtask 70-21-07-110-060

A. Visually check for the removal of all traces of oxide on the part.

B. If oxides are still present on the part after this cleaning, refer to TASK 70-21-04-120-E01, Dry Abrasive Blast Cleaning - Method No. 4E, to remove the contaminants.

6. Ultrasonic Agitation of the Solution(s).

Subtask 70-21-07-110-539

CAUTION: ULTRASONIC CLEANING AND RINSING MUST NOT BE APPLIED TO SOFT METALS SUCH AS ALUMINUM AND MAGNESIUM WITHOUT SPECIFIC APPROVAL IN THE PROCESS DOCUMENT. SPECIAL TESTING CAN BE NECESSARY FOR THESE MATERIALS.

CAUTION: OTHER AGITATION METHODS (LIKE AIR AGITATION, MAGNETIC AGITATION, ETC) MUST NOT BE USED DURING ULTRASONIC AGITATION PROCESS OR DAMAGE TO THE PART CAN OCCUR.

A. Ultrasonic agitation of the solution can be used to increase the efficiency of the cleaning process. This subtask gives process parameters for ultrasonic agitation. Refer also to Subtask 70-21-07-110-539 for safety precautions and general information.

NOTE: Usually, the lower the frequency is, the stronger the cavitation action and cleaning efficiency is.

NOTE: Ultrasonic agitation process can only be used for approved part(s). Approval for use of "ultrasonic agitation" shall be obtained from design/life cycle engineer of the part. Submit data in Subtask 70-21-07-110-539 and listed in Figure 1 to GE AVIATION Customer Support Center.

B. Processing tank with temperature control.

(1) The ultrasonic tank should be made of stainless steel and be equipped with either a heat exchanger or heating coil capable of controlling the working solution at the minimum and the maximum operating temperature established.

NOTE: The ultrasonic energy will tend to increase the temperature of the working bath. It must be taken into consideration during monitoring the bath operating temperature ranges.

CAUTION: THE LIQUID IN THE ULTRASONIC UNIT MUST BE AT THE CORRECT WORKING DEPTH OR DAMAGE TO THE PARTS CAN OCCUR.

(2) The tank should be clearly labeled with the minimum operating level.

(3) The tank must be provided with an automatic timer interlock to shut off the ultrasonic equipment, a low solution level shut-off interlock, or with a minimum solution level marker. The tank should be identified and clearly labeled with the chemical contents, power density, frequency of the ultrasonic unit, and rated capacity in gallons (or liters).

C. Generator requirements.

CAUTION: THE PARTS MUST NOT TOUCH THE TRANSDUCERS OR DAMAGE TO THE PARTS CAN OCCUR.

(1) The generator must be a fixed power rating and not be adjustable by the operator.

(a) The ultrasonic tank must be operated at a frequency between 25 and 80 kHz and shall be maximum 80 watts/gallons (21.1 watts per liter) power density.

(b) Transducers should be equipped with High Sweep Modulation capability for optimum cleaning efficiency. The sweep range should be 0.5 to 4 kHz.

NOTE: Cavitation meters/probes can be used for determination of tank properties.

CAUTION: ULTRASONIC ENERGY WILL TEND TO INCREASE THE TEMPERATURE OF THE WORKING BATH, SO COOLING AS WELL AS HEATING CAPABILITY MAY BE NECESSARY. THE BATH OPERATING TEMPERATURE RANGES MUST BE CAREFULLY MONITORED.

CAUTION: IT IS CRITICAL THAT THERE BE NO DIRECT MECHANICAL CONTACT BETWEEN THE ENGINE COMPONENT AND THE ULTRASONIC TRANSDUCER OR THE TANK. IF CONTACT OCCURS, HOLD THE PARTS AND CONSULT YOUR GE AVIATION REPRESENTATIVE FOR DISPOSITION.

CAUTION: NEW AND COLD SOLUTIONS ARE TO BE DEGASSED PRIOR TO USE. THE TIME REQUIRED FOR DEGASSING SOLUTIONS WILL VARY DEPENDING ON THE TANK CAPACITY AND TEMPERATURE. THIRTY MINUTES IS USUALLY ADEQUATE TO DEGAS HEATED SOLUTIONS. IF THE SOLUTION HAS BEEN PREVIOUSLY DEGASSED BUT HAS BEEN ALLOWED TO COOL, 10 MINUTES IS USUALLY ADEQUATE TO DEGAS THE HEATED SOLUTION.

EVIDENCE THAT A SOLUTION HAS BEEN ADEQUATELY DEGASSED IS WHEN AIR BUBBLES ARE NO LONGER BEING GENERATED BY THE LIQUID.

D. Ultrasonic cleaning units must be checked for operating efficiency periodically, at a frequency depending on the usage, with a suitable method.
   (1) Alternative Method:
      (a) Use Heavy Duty Reynolds Aluminum Foil, or similar aluminum foil, 0.009 inch (0.023 centimeter) in thickness.
      (b) Fabricate a foil sheet such that when placed vertically in the tank, foil spans the entire depth and the longest width of tank dimensions.
         1 Bend edges of foil for rigidity (to prevent foil from bending when placing in solution/tank).
         2 If the span is too large for one sheet of foil, fabricate a stainless-steel light rod framework (such as welding rod) to attach the foil.
      (c) Cleaning solution shall be process solution itself or water and temperature shall be what cleaning temperature is in the process.

      NOTE: Aluminum foil reacts with alkaline solutions.

      NOTE: Initial temperature should be set to minimum to avoid any possible overheating of the solution caused by ultrasonic agitation.

      WARNING: OPERATOR MUST WEAR FACE SHIELD, GLOVES, PROTECTIVE CLOTHING AND PROTECTIVE SHOES.

      CAUTION: ALUMINUM FOIL MAY REACT WITH CLEANING SOLUTION. USE WATER FOR SUCH CASES.

      (d) Degas cleaning solution in an ultrasonic tank for the required time (approximately 15 minutes) for maximum cavitation intensity.
      (e) Immerse aluminum foil vertically into an ultrasonic tank slow and gently to minimize disturbing the sheet.
      (f) Keep aluminum foil immersed in an active ultrasonic tank for one minute.
      (g) Remove aluminum foil sheet vertically slow and gently to minimize disturbing the sheet.

      NOTE: The ultrasonic generator must be OFF during immersion and removal of foil.
   (2) Alternative Method:
      (a) If contamination by aluminum foil debris is not desired, the foil must be immersed in a suitability sized glass beaker that contains water.
      (b) Degas the water in the beaker for 10 minutes for maximum cavitation intensity.
      (c) Put the beaker in the solution and minimize the attenuation of the ultrasonic vibrations.
      (d) Keep the foil immersed in the water in the beaker for 90 seconds of operation.

      NOTE: Repeat the test several times with new foil for each different positions in the working zone. The number of times depending on the size of the tank.
   (3) Acceptance Criteria. Foil must have a complete and even distribution pattern of pockmarks or indentations throughout entire sheet. Some tiny through holes may be created, and are acceptable if there is a relatively even distribution of these holes.
   (4) Rejection. If foil patterns include lack of or light pockmark patters, inconsistent and uneven pockmark distribution, and large through hole(s) in localized areas, the bath cannot be used for cleaning process.
   (5) Operating efficiency of the equipment should be repeated after:
      (a) The first installation, upgrades, or repair of ultrasonic equipment (comprised of transducers, controls, wiring, power unit).
      (b) The first installation of the immersion tank.
      (c) Repair on the wetted walls of the immersion tank.

E. Fixture requirements.
   (1) The parts must be suspended in the tank completely independent of the tank sidewalls, tank bottom, or transducer surface.
   (2) The fixtures can be hung from the lip of the tank if the points of contact are insulated or dampened from the ultrasonic transducer or the tank.
   (3) Parts should be placed accurately that the parts never touch transducers or the tank walls and bottom. If the parts have holes and/or cavities, the parts should be rotated to be sure that all holes and/or cavities are filled with cleaning solution and all the air is removed.
   (4) Part-to-part or metal (rack)-to-part contact during ultrasonic cleaning is not permitted. If more than one part is cleaned at a time, it is recommended that you use fixtures to put the parts in position so that it is impossible for the parts to touch one another during the ultrasonic agitation.
   (5) Fixtures should be designed to maximize mesh opening size.
   (6) Fixtures should be fabricated from plastic or plastic-coated metal to minimize the risk of part damage at the point of contact with the fixture.

CAUTION: MAXIMUM IMMERSION TIME IS ESTABLISHED DURING QUALIFICATION. ENSURE MAXIMUM EXPOSURE TIME AS PER QUALIFICATION IS NOT EXCEEDED IN PROCESS.

F. Process requirements.
   (1) For every new part to be cleaned with the assistance of ultrasonic, the 1st article must be run 4X (4 times) the maximum time based on the historical time needed to clean the part using the standard cleaning process. This should include the time in each tank of the cleaning process that is to be equipped with ultrasonic capability. All standard non-destructive inspections required for the part should be completed before and shall be completed after the 4X cleaning test to assure no damage or cracks are caused by the cleaning process.

(2) A demonstration of the cleaning procedure is necessary on a stock loss coupon of the alloy in question. This demonstration must use 4X (4 times) the maximum time based on the historical time needed to clean the part using the standard cleaning process. This should include the time in each tank of the cleaning process that is to be equipped with ultrasonic capability, maximum temperature and concentration of solution developed for the application. Stock loss testing should be performed according to ARP1755.

(3) Filtration and cleanliness requirements should be established for the cleaning solutions.

*** * * FOR ALL**

EQUIPMENT	DESCRIPTION OF TANK DIMENSIONS	LENGTH, WIDTH, HEIGHT (cm/inch)	
		ACTUAL VOLUME OF SOLUTION (gallons/liters)	
	DESCRIPTION OF GENERATOR AND FREQUENCY USED	WATTS/GALLON (watts/liter)	
	DESCRIPTION OF HIGH-END MODULATION (SWEEP FREQUENCY) RANGE	kHz	
PROCESS	PROCESS	SPM ATA NUMBER OF THE PROCESS	
	SOLUTION CONCENTRATION	SOLUTION CODE	
	PROCESS TIME IN TANK	minutes	
	SOLUTION TEMPERATURE RANGE	°C/°F	
	FIXTURE IDENTIFICATION DESCRIPTION OF HOW SUPPORTED		
PART	P/N SUBJECTED TO THE ULTRASONIC CLEANING	MENTION THE PART FINISH OF THE PART (E.G. COATING)	
COMPATIBILITY	STOCK LOSS CALCULATED	ACCORDING TO ARP1755 TO SUBJECTED PART BASE MATERIALS (inch)	
	NDT RESULTS	VIBE ANALYSIS RESULTS (IF EXISTS) OR NDT RESULTS PART REQUIRED	

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Figure 1 Cleaning Process Control Sheet for Ultrasonic Agitation