LIGO-E940007-00-B

Facsimile Cover Sheet

To: Larry K. Jones
Company: Caltech
Phone: 818/395-2970
Fax: 818/304-9834

From: Charles N. Sherlock
Company: CBI
Phone: 713/896 - 3769
Fax: 713/466 - 4259

Date: February 23, 1994
Pages including this cover page: Twenty five (25)

Comments:

Larry, here is revision 0 of procedure CLCOUPA with your comments incorporated. Here also is revision 2 of procedure CLCOUPAO and revision 1 of procedure CLCOUPA1 with channel locks replacing the tongs. This should complete the alternate coupon cleaning procedures.

Two sets of the coupons are cleaned and ready to ship. The third set will be cleaned and ready to ship by noon.

See you tomorrow. Regards.

Chuck

Chuck Sherlock
Houston Corporate Welding

cc: Marty Tellalian - Plainfield CBITS - NOE
Ken Flessas - CBILCH

CBI

DOC. ID CLCOUPA
REV. NO. 0
CONTRACT 930212

TITLE FOR SURFACE ANALYSIS AND OUTGASSING TEST CLEANING OF PLAIN COUPONS CALTECH

PAGE NO. 1 OF 8

APPROVED	Engr	Corp Weld	Corp QA	Const	Mfg

	BY	DATE
PREPARED	CNS	02-22-94
REVISED		
AUTHORIZED		
REFERENCED STANDARD		REV. NO.

1.0 SCOPE:

This coupon cleaning procedure covers both the initial hydrocarbon contamination of the plate material and the Oakite 33 cleaning of forty nine (49) coupons cut from that plate material in areas that contain no old or new marker dye marks. One (1) 0.115" x 1" x 18" coupon will be used for post clean cutting by others into ten (10) or more 0.115" x 1 cm x 1 cm coupons for surface analysis by the XPS, SIMS and Auger methods. Eight (8) of these will be hydrocarbon contaminated and two (2) will be uncontaminated. Forty eight (48) 0.115" x 1" x 18" coupons will be used for the hydrogen outgassing test.

2.0 PERSONNEL:

Experienced personnel shall perform and supervise all cleaning performed in accordance with this procedure.

3.0 REFERENCES:

3.1 California Institute of Technology Technical Specification Number 1100004 for Beam Tube Modules and Number 1100007 for Type 304L Stainless Steel Vacuum Products.

3.2 ASTM Designation A 380 Standard Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems (as a guide).

3.3 Package and ship per Caltech instructions (see step 5.23 of this procedure).

4.0 EQUIPMENT AND MATERIALS:

4.1 Lint free cloths or paper towels.

4.2 100 Watt blacklight with 3650 Angstrom unit wavelength.

4.3 Blacklight meter capable of measuring at least 800 $\mu w/cm^2$.

4.4 Litmus paper or pH meter.

4.5 One (1) five (5) gallon container of de-ionized or distilled water.

4.6 Oakite 33.

4.7 Oakite Enprox 714.

4.8 One (1) metal drum and one (1) heater for heating the de-ionized (distilled) water/Oakite 33 cleaning solution and de-ionized (distilled) rinse water.

4.9 Metal or glass tube thermometer with a range in excess of 160°F.

4.10 Two (2) vinyl polyester recovery containment pallet systems for catching and retaining the used cleaning and rinse solutions.

4.11 Clean Nitrilite chemical resistant gloves and neoprene or other chemical resistant apron or coveralls, face shields or goggles with side shields and foot coverings as needed.

4.12 Dust/mist respirators with exhalation valve that are NIOSH/MSHA approved such as Zee #2304.

4.13 Two (2) chemical resistant plastic two (2) gallon containers for the pump type sprayers. One (1) for mixing and holding the Oakite 33 cleaning mixture and one (1) for holding the de-ionized (distilled) rinse water.

4.14 Caltech supplied Ameristat packaging plastic.

4.15 Electrical tie wraps.

4.16 Supra Tech non-detergent SAE 30 motor oil.

4.17 Paint brush approximately one (1) inch wide.

4.18 Clean metal channel locks.

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4.19 Stainless steel 304L heat treated material supplied by Caltech for the test coupons. Use material from an area or areas that contain no old or new marker dye marks.

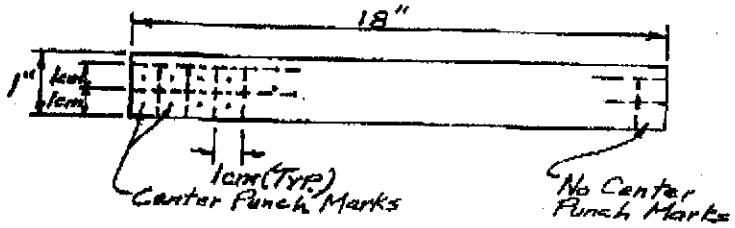
4.20 Clean blunt nose center punch.

4.21 One (1) 0.115" x 1" x 18" coupon with a J type thermocouple attached from previous alternate coupon cleaning procedures.

4.22 Digital thermocouple readout unit.

5.0 PROCEDURE:

5.1 Before shearing the coupons from the Caltech supplied sheets of heat treated 304L stainless steel, center punch mark the surface which is to be hydrocarbon contaminated at a minimum of forty nine (49) locations. For all forty nine (49) coupons, these locations shall be slightly off-center toward the end to be contaminated of the anticipated sheared position of each of these coupons. For the forty ninth (49th), also center punch mark the anticipated location of the eight (8) 1 cm x 1 cm contaminated surface analysis coupons in the 1" x 18" coupon being shipped to MIT. See the cutting sketch below.



5.2 Brush motor oil across the anticipated shear lines on the steel sheet surface in a pattern that will ultimately result in an oil residue coating of approximately one half of the surface on the center punched side of each of the forty eight (48) 1" x 18" hydrogen outgassing coupons. It should cover half of the surface of the forty ninth (49th) coupon on the end with the center punch marks from which eight (8) contaminated 0.115" x 1 cm x 1 cm surface analysis coupons will be cut. Two (2) 0.115" x 1 cm x 1 cm coupons will be cut from the other uncontaminated end.

5.3 Wipe the excess motor oil from the surface of the sheet steel with clean clothes or paper towels until it feels dry to the touch.

5.4 Shear the coupons from areas of the steel sheet having no old or new marker dye marks following the layout instructions.

5.5 In the cleaning area arrange two (2) vinyl polyester recovery containment systems. One to catch and retain the used Oakite 33 cleaning solution and the other to serve as a draining and drying rack for the coupons. The use of the second recovery system will prevent the draining and drying rack pallet grids from becoming contaminated with the Oakite 33 cleaning solution and, in turn, possibly contaminating the cleaned coupons. The cleaning area shall be in a protected area out of the weather.

5.6 Nearly fill both chemical resistant pump type plastic sprayers with de-ionized (distilled) water.

5.7 Mix a 2% by volume solution of Oakite 33 with the de-ionized (distilled) water in one (1) of the two (2) gallon chemical resistant pump type plastic sprayers.

5.8 Place each chemical resistant pump type plastic sprayer in a metal drum partially filled with tap water.

5.9 Heat the de-ionized (distilled) rinse water and the Oakite 33 cleaning solution in each of the pump type sprayers to a temperature of approximately 160°F by heating the tap water in the metal drum. Check the temperature of the de-ionized (distilled) rinse water and Oakite 33 cleaning solution with the metal or glass thermometer.

5.10 While heating the de-ionized (distilled) rinse water and Oakite 33 cleaning solution, remove the pallet grids from both vinyl polyester recovery containment systems. As soon as the Oakite cleaning solution and rinse water are at the required temperature, thoroughly spray the four pallets of the two recovery containment systems with the Oakite solution followed by the rinse water to remove any dirt or other contaminants from their surface. After the pallet grids have been cleaned, replace them on the interstices of the recovery systems.

5.11 Clean with Oakite 33 cleaning solution the channel locks to be used in the next step.

5.12 To clean the coupons, hold each coupon by the uncontaminated end with the set of channel locks cleaned in the previous step. For the coupon that is to be cut for surface analysis coupons, hold it by the end away from the multiple center punch marks. When spraying with the pump type sprayer, let the coupon hang down from the channel locks over the one recovery containment system.

5.13 With the pump type sprayer containing the 140°F to 160°F de-ionized (distilled) water held only a few inches away, thoroughly spray rinse all the surfaces of the coupon. Allow the de-ionized (distilled) water to run off into the recovery containment system.

5.14 While still holding the rinsed coupon, with the pump type sprayer containing the 140°F to 160°F Oakite 33 cleaning solution held only a few inches away, thoroughly spray all surfaces of the coupon with Oakite 33 cleaning solution for a minimum of fifteen (15) seconds to a maximum of twenty (20) seconds. Also monitor the thermocouple reading during the Oakite 33 spray cleaning of that temperature indicating coupon and record the maximum surface temperature noted.

5.15 While still holding the Oakite 33 cleaned coupon with the channel locks, stand it on end 2" to 3" apart from other coupons by placing one end of the coupon in one of the grooves between a vinyl polyester pallet grid and the interstices of the vinyl polyester recovery containment system over which the coupon was being sprayed with the Oakite 33 cleaner.

5.16 Wait for five (5) minutes and repeat step 5.14 for each coupon.

5.17 After another five (5) minutes have elapsed, repeat step 5.13. Thoroughly rinse the coupons to remove all traces of the Oakite 33 cleaning residue.

5.18 Allow the coupons to air dry. Only use the electric hot air dryer if the humidity is so high as to prevent rapid drying of the coupons.

5.19 Add Oakite Enprox 714 to the used Oakite 33 cleaning solution in the vinyl polyester recovery containment system until the solution is neutralized to a pH of 7 as indicated by the pH meter or the litmus paper remaining gray when dipped in the solution

5.20 When the used Oakite 33 cleaning solution is neutralized, drain it into the sewer.

5.21 After the coupons are thoroughly dry, place a dust/mist respirator over one's mouth and nose. Just before handling the coupons, put on clean Nitrilite gloves. Be careful not to touch the outside of the gloves with the hands. While wearing the respirator and the gloves, wrap all of the coupons in a piece of Ameristat plastic laid on a cart with the inside surface of the roll turned upward. Fold the plastic over the coupons for protection and carry them to a darkened lab room.

5.22 Excluding the coupon with the thermocouple attached, blacklight inspect all coupons for hydrocarbon contamination as follows:

5.22.1 Turn on and warm up the blacklight for a minimum of five (5) minutes.

5.22.2 The examiner shall be in the darkened area for at least five (5) minutes to allow time for eye adaptation to the darkness prior to viewing the surface. If the examiner wears glasses or lenses, they shall not be photosensitive.

5.22.3 Confirm the maximum distance at which the blacklight produces 800 $\mu w/cm^2$ on the examination surface using the blacklight meter.

5.22.4 Put on new clean Nitrilite gloves before handling coupons in the darkened area.

5.22.5 In the darkened area, blacklight inspect all surfaces of all coupons. During the inspection, hold the blacklight no further or no closer from the examination surface than the distance established in step 5.22.3. Use extra care when inspecting the previously contaminated center punched surface of each coupon.

5.22.6 Record observations of any significant residual hydrocarbon contamination (fluorescent glow at 800 $\mu w/cm^2$) revealed on the surfaces of the coupons by the blacklight inspection.

5.23 Package and ship the forty eight (48) hydrogen outgassing coupons to Larry Jones at Caltech and the forty ninth (49th) coupon with extra center punch marks to Rainer Weiss at MIT in accordance with the Caltech instructions given as follows:

5.23.1 Place a piece of Ameristat film on a bench with the inside surface of the roll turned upward to provide a clean work surface.

5.23.2 Handle all coupons and film only when wearing dust/mist respirators and clean Nitrilite chemical resistant gloves.

5.23.3 Wrap twelve (12) hydrogen outgassing coupons to a bundle. In a separate bundle wrap the single coupon from which the surface analysis coupons will be cut by MIT.

5.23.4 Keep the inside surface of the film roll toward the inside surface of the package being wrapped. Limit film handling to outside edges only.

5.23.5 Wrap coupons with at least two (2) layers of film so that the outside edges do not come in contact with the coupons. Accomplish this by rolling the film around the short dimension of the coupons or coupon. Then fold the outer edges of the film to the middle.

5.23.6 Secure the film around the bundle with two (2) or more electrical tie wraps.

5.23.7 Label each bundle with the date wrapped, the identification of the cleaning procedure used to clean the coupons and the maximum coupon surface temperature noted during either the cleaning or the rinsing phase.

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5.23.8 Pack the wrapped 0.115" x 1" x 18" hydrogen outgassing coupon bundles in a corrugated box. Add filler material as necessary for protection against possible shipping damage.

5.23.9 Label this box and ship these hydrogen outgassing coupons via Airborne, Federal Express or UPS to:

California Institute of Technology
Attention: Larry K. Jones 102 - 33
Pasadena, CA 91125

5.23.10 In a second corrugated box pack the single coupon for cutting into surface analysis coupons. Add filler packing material as necessary for protection against possible shipping damage.

5.23.11 Label this box and ship these surface analysis coupons via Airborne, Federal Express or UPS to:

Attention: Rainer Weiss
Room 20B145
Massachusetts Institute of Technology
18 Vassar Street
Cambridge, MA 02139

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DOC. ID CLCOUPA0
REV. NO. 2
CONTRACT 930212

TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #0
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

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APPROVED

Engr	Corp Weld	Corp QA	Const	Mfg

	BY	DATE
PREPARED	CNS	02-16-94
REVISED	CNS	02-22-94
AUTHORIZED		
REFERENCED STANDARD		REV. NO.

1.0 SCOPE:

This alternate coupon cleaning procedure covers both the initial hydrocarbon contamination of the plate material and the cleaning of fifty (50) coupons cut from that plate material in areas that contain no old or new marker dye marks. One (1) 0.115" x 1" x 18" coupon will be used for post clean cutting by others into ten (10) or more 0.115" x 1 cm x 1 cm coupons for surface analysis by the XPS, SIMS and Auger methods. Eight (8) of these will be hydrocarbon contaminated and two (2) will be uncontaminated. Forty eight (48) 0.115" x 1" x 18" coupons will be used for the hydrogen outgassing test. The extra one (1) 0.115" x 1" x 18" coupon will have a thermocouple attached for determining the typical maximum coupon temperature during steam cleaning. This same coupon with the thermocouple attached will be used in each of the alternate coupon cleaning procedures investigated.

2.0 PERSONNEL:

Experienced personnel shall perform and supervise all cleaning performed in accordance with this alternate procedure.

3.0 REFERENCES:

3.1 California Institute of Technology Technical Specification Number 1100004 for Beam Tube Modules and Number 1100007 for Type 304L Stainless Steel Vacuum Products.

3.2 ASTM Designation A 380 Standard Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems (as a guide).

3.3 Package and ship per Caltech instructions (see step 5.18 of this procedure).

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TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #0
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

4.0 EQUIPMENT AND MATERIALS:

4.1 Lint free cloths or paper towels.

4.2 100 Watt blacklight with 3650 Angstrom unit wavelength.

4.3 Blacklight meter capable of measuring at least 800 $\mu w/cm^2$.

4.4 Electric hot air dryer.

4.5 Steam cleaner (Jenny) with a heater coil and a dead man type hand held sprayer.

4.6 Two (2) vinyl polyester recovery containment pallet systems for catching and retaining the used cleaning and rinse solutions.

4.7 Clean Nitrilite chemical resistant gloves and neoprene or other chemical resistant apron or coveralls, face shields or goggles with side shields and foot coverings as needed.

4.8 Dust/mist respirators with exhalation valve that are NIOSH/MSHA approved such as Zee #2304.

4.9 Caltech supplied Ameristat packaging plastic.

4.10 Electrical tie wraps.

4.11 Supra Tech non-detergent SAE 30 motor oil .

4.12 Paint brush approximately one inch (1") wide.

4.13 Clean metal channel locks.

4.14 Stainless steel 304L heat treated material supplied by Caltech for the test coupons. Use material from an area or areas that contain no old or new marker dye marks.

4.15 Clean blunt nose center punch.

4.16 J Type thermocouple.

4.17 Digital thermocouple readout unit.

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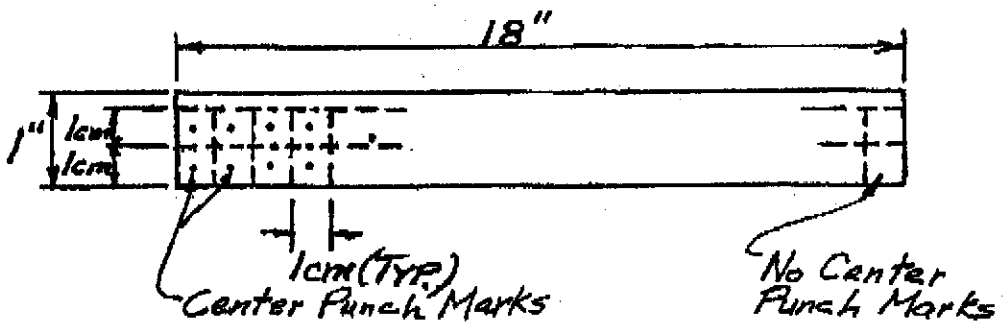
TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #0
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

5.0 PROCEDURE:

5.1 Before shearing the coupons from the Caltech supplied sheets of heat treated 304L stainless steel, center punch mark the surface which is to be hydrocarbon contaminated at a minimum of fifty (50) locations. For all fifty (50) coupons, these locations shall be slightly off-center toward the end to be contaminated of the anticipated sheared position of each of these coupons. For the fiftieth (50th) coupon, also center punch mark the anticipated location of the eight (8) 1cm x 1cm contaminated surface analysis coupons in the 1" x 18" coupon being shipped to MIT. See the cutting sketch below.



5.2 Brush motor oil across the anticipated shear lines on the steel sheet surface in a pattern that will ultimately result in an oil residue coating of approximately one half of the surface on the center punched side of each of the forty nine (49) 1" x 18" hydrogen outgassing coupons. It should cover half of the surface of the fiftieth (50th) coupon on the end with the center punch mark from which eight (8) contaminated 0.115" x 1 cm x 1 cm surface analysis coupons will be cut. Two (2) 0.115" x 1 cm x 1 cm coupons will be cut from the other uncontaminated end.

5.3 Wipe the excess motor oil from the surface of the sheet steel with clean clothes or paper towels until it feels dry to the touch.

5.4 Shear the coupons from areas of the steel sheet having no old or new marker dye marks following the layout instructions.

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BY ALTERNATE METHOD #0
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

5.5 Adjacent to the steam jenny, place two (2) vinyl polyester recovery containment pallet systems. One to catch and retain the used condensed steam liquid and the other to serve as a draining and drying rack for the coupons. The use of the second recovery system will prevent the draining and drying rack pallet grids from becoming contaminated with the condensed steam run-off and, in turn, possibly contaminating the cleaned coupons. This is in a protected area.

5.6 Turn on the steam cleaner heating coils.

5.7 Spray water from the steam cleaner spray nozzle into the sanitary sewer drain until it reaches the boiling point (turns to steam).

5.8 Remove the pallet grids from both vinyl polyester recovery containment systems. With the steam cleaner sprayer held only a few inches away, thoroughly spray the four pallet grids of the two vinyl polyester recovery containment systems to remove any dirt or other contaminants from their surface. After the pallet grids are steam cleaned, replace them on the interstices of the recovery systems.

5.9 Attach a thermocouple to the surface of one of the 1" x 18" hydrogen outgassing coupons approximately in the middle of the 18" length on the side opposite from the center punch mark.

5.10 Steam clean the channel locks to be used in the next step.

5.11 To steam clean the coupons, hold each coupon by the uncontaminated end with the set of channel locks cleaned in the previous step. For the coupon that is to be cut for surface analysis coupons, hold it by the end away from the center punch mark. When spraying with the steam cleaner, let the coupon hang down from the channel locks over the one recovery containment system. With the steam cleaner sprayer held only a few inches away, thoroughly spray all the surfaces of the coupon for a minimum of fifteen (15) seconds to a maximum of twenty (20) seconds. When spraying is partially complete, momentarily place the coupon in a groove between a pallet grid and the interstices of that recovery system. Lift the coupon again with the channel locks shifted a few inches on the coupon to expose the coupon area

5.11 (cont'd)

previously covered by the channel locks. Complete the steam cleaning of that coupon. Also monitor the thermocouple reading during the steam cleaning of that coupon and record the maximum coupon surface temperature noted.

5.12 While still holding the steam cleaned coupon with the channel locks, stand it on end by placing one end of the coupon in one of the grooves between a vinyl polyester pallet grid and the interstices of the previously unused vinyl polyester recovery containment system.

5.13 Repeat steps 5.11 and 5.12 for each coupon. When standing them on end to dry, set them 2" to 3" inches apart.

5.14 Allow the coupons to air dry. Only use the electric hot air dryer if the humidity is so high as to prevent rapid drying.

5.15 After the coupons are thoroughly dry, place a dust/mist respirator over one's mouth and nose. Just before handling the coupons, put on clean Nitrilite chemical resistant gloves. Be careful not to touch the outside of the gloves with the hands. While wearing the respirator and the gloves, wrap all of the coupons in a piece of Ameristat plastic laid on a cart with the inside surface of the roll turned upward. Fold the plastic over the coupons for protection and carry them to a darkened lab room.

5.16 Dispose of the cleaning/rinse condensed steam liquid by flushing it into the sanitary sewer.

5.17 Excluding the coupon with the thermocouple attached, blacklight inspect all the other cleaned coupons for hydrocarbon contamination as follows:

5.17.1 Turn on and warm up the blacklight for a minimum of five (5) minutes.

5.17.2 The examiner shall be in the darkened area for at least five (5) minutes to allow time for eye adaptation to the darkness prior to viewing the coupon surfaces. If the examiner wears glasses or lenses, they shall not be photosensitive.

5.17.3 Confirm the maximum distance at which the blacklight produces 800 $\mu w/cm^2$ on the examination surface using the blacklight meter.

5.17.4 Put on new clean Nitrilite gloves before handling any coupons in the darkened area.

5.17.5 In the darkened area, blacklight inspect all surfaces of all coupons. During the inspection, hold the blacklight no further or no closer from the examination surface than the distance established in step 5.17.3. Use extra care when inspecting the previously contaminated center punched surface of each coupon.

5.17.6 If the blacklight inspection reveals no hydrocarbon contamination (no fluorescent glow at 800 $\mu w/cm^2$) on the surfaces of the coupons, proceed to step 5.18. If the blacklight inspection reveals residual amounts of hydrocarbon contamination, void this cleaning method procedure as inadequate.

5.18 Package and ship the forty eight (48) hydrogen outgassing coupons to Larry Jones at Caltech and the forty ninth coupon with extra center punch marks to Rainer Weiss at MIT in accordance with the Caltech instructions given as follows:

5.18.1 Place a piece of Ameristat film on a bench with the inside surface of the roll turned upward to provide a clean work surface.

5.18.2 Handle all coupons and film only when wearing dust/mist respirators and clean Nitrilite chemical resistant gloves.

5.18.3 Wrap twelve (12) hydrogen outgassing coupons to a bundle. In a separate bundle wrap the single coupon from which the surface analysis coupons will be cut by MIT.

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BY ALTERNATE METHOD #0
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

5.18.4 Keep the inside surface of the film roll toward the inside surface of the package being wrapped. Limit film handling to outside edges only.

5.18.5 Wrap coupons with at least two (2) layers of film so outside edges do not come in direct contact with the coupons. Accomplish this by rolling the film around the short dimension of the coupon(s). Then fold the outer edges of the film to the middle.

5.18.6 Secure the film around the bundle with two (2) or more electrical tie wraps.

5.18.7 Label each bundle with the date wrapped, the identification of the cleaning procedure used to clean the coupons and the maximum coupon surface temperature noted during cleaning.

5.18.8 Pack the wrapped 0.115" x 1" x 18" hydrogen outgassing coupon bundles in a separate corrugated box. Add filler packing material as necessary for protection against possible shipping damage.

5.18.9 Label this box and ship these hydrogen outgassing coupons via Airborne, Federal Express or UPS to:

California Institute of Technology
Attention: Larry K. Jones 102 - 33
Pasadena, CA 91125

5.18.10 In a second corrugated box pack the single coupon for cutting into surface analysis coupons. Add filler packing material as necessary for protection against possible shipping damage.

5.18.11 Label this box and ship this coupon via Airborne, Federal Express or UPS to:

Attention: Rainer Weiss
Room 20B145
Massachusetts Institute of Technology
18 Vassar Street
Cambridge, MA 02139

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DOC. ID CLCOUPA1
REV. NO. 1
CONTRACT 930212

TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #1
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

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APPROVED

Engr	Corp Weld	Corp QA	Const	Mfg

	BY	DATE
PREPARED	CNS	02-18-94
REVISED	CNS	02-22-94
AUTHORIZED		
REFERENCED STANDARD	REV. NO.	

1.0 SCOPE:

This alternate coupon cleaning procedure covers both the initial hydrocarbon contamination of the plate material and the Mirachem 500 cleaning of forty nine (49) coupons cut from that plate material in areas that contain no old or new marker dye marks. One (1) 0.115" x 1" x 18" coupon will be used for post clean cutting by others into ten (10) or more 0.115" x 1 cm x 1 cm coupons for surface analysis by the XPS, SIMS and Auger methods. Eight (8) of these will be hydrocarbon contaminated and two (2) will be uncontaminated. Forty eight (48) 0.115" x 1" x 18" coupons will be used for the hydrogen outgassing test.

2.0 PERSONNEL:

Experienced personnel shall perform and supervise all cleaning performed in accordance with this alternate procedure.

3.0 REFERENCES:

3.1 California Institute of Technology Technical Specification Number 1100004 for Beam Tube Modules and Number 1100007 for Type 304L Stainless Steel Vacuum Products.

3.2 ASTM Designation A 380 Standard Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems (as a guide).

3.3 Package and ship per Caltech instructions (see step 5.25 of this procedure).

4.0 EQUIPMENT AND MATERIALS:

4.1 Lint free cloths or paper towels.

4.2 100 Watt blacklight with 3650 Angstrom unit wavelength.

4.3 Blacklight meter capable of measuring at least 800 $\mu w/cm^2$.

4.4 Electric hot air dryer.

4.5 Mirachem 500 Cleaner/Degreaser.

4.6 Steam cleaner (Jenny) with a heater coil and a dead man type hand held sprayer.

4.7 Two (2) vinyl polyester recovery containment pallet systems for catching and retaining the used cleaning and rinse solutions.

4.8 Clean Nitrilite chemical resistant gloves and neoprene or other chemical resistant apron or coveralls, face shields or goggles with side shields and foot coverings as needed.

4.9 Dust/mist respirators with exhalation valve that are NIOSH/MSHA approved such as Zee #2304.

4.10 Two (2) chemical resistant plastic two (2) gallon containers for pump type sprayers.

4.11 Caltech supplied Ameristat packaging plastic.

4.12 Electrical tie wraps.

4.13 Supra Tech non-detergent SAE 30 motor oil.

4.14 Paint brush approximately one inch (1") wide.

4.15 Clean metal channel locks.

4.16 Stainless steel 304L heat treated material supplied by Caltech for the test coupons. Use material from an area or areas that contain no old or new marker dye marks.

4.17 Clean blunt nose center punch.

4.18 One (1) 0.115" x 1" x 18" coupon with a J type thermocouple attached from previous alternate coupon cleaning procedures.

4.19 Digital thermocouple readout unit.

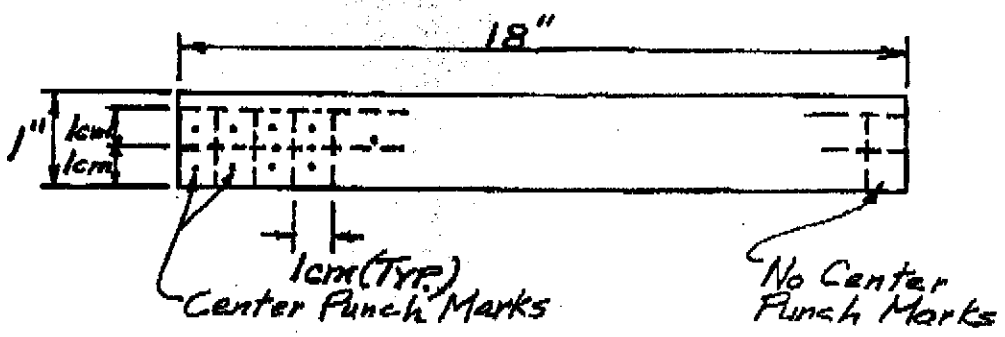
CBI

DOC. ID CLCOUPA1
REV. NO. 1
CONTRACT 930212

TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #1
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

5.0 PROCEDURE:

5.1 Before shearing the coupons from the Caltech supplied sheets of heat treated 304L stainless steel, center punch mark the surface which is to be hydrocarbon contaminated at a minimum of forty nine locations. For all forty nine (49) coupons, these locations shall be slightly off-center toward the end to be contaminated of the anticipated sheared position of each of these coupons. For the forty ninth (49th) coupon, also center punch mark the anticipated location of the eight (8) 1 cm x 1 cm contaminated surface analysis coupons in the 1" x 18" coupon being shipped to MIT. See the cutting sketch below.



5.2 Brush motor oil across the anticipated shear lines on the steel sheet surface in a pattern that will ultimately result in an oil residue coating of approximately one half of the surface on the center punched side of each of the forty eight (48) 1" x 18" hydrogen outgassing coupons. It should cover half of the surface of the forty ninth (49th) coupon on the end with the center punch marks from which eight (8) contaminated 0.115" x 1 cm x 1 cm surface analysis coupons will be cut. Two (2) 0.115" x 1 cm x 1 cm coupons will be cut from the other uncontaminated end.

5.3 Wipe the excess motor oil from the surface of the sheet steel with clean clothes or paper towels until it feels dry to the touch.

5.4 Shear the coupons from areas of the steel sheet having no old or new marker dye marks following the layout instructions.

5.5 Adjacent to the steam jenny, place two (2) vinyl polyester recovery containment pallet systems. One to catch and retain the used Mirachem 500 cleaning solution and condensed steam rinse liquid and the other to serve as a draining and drying rack for the coupons. The use of the second recovery system will prevent the draining and drying rack pallet grids from becoming contaminated with the Mirachem 500 cleaning solution and condensed steam run-off and, in turn, possibly contaminating the cleaned coupons. This is in a protected area.

5.6 Turn on the steam cleaner heating coils.

5.7 Spray water from the steam cleaner spray nozzle into the sanitary sewer drain until it reaches the boiling point (turns to steam).

5.8 Remove the pallet grids from both vinyl polyester recovery containment systems. With the steam cleaner sprayer held only a few inches away, thoroughly spray the four pallet grids of the two vinyl polyester recovery containment systems to remove any dirt or other contaminants from their surface. After the pallet grids are steam cleaned, replace them on the interstices of the recovery systems.

5.9 Mix one (1) part by volume of Mirachem 500 cleaner/degreaser with three (3) parts of water in both of the plastic spray containers in a quantity sufficient to nearly fill both pump type sprayer plastic containers.

5.10 Insert the screened suction line of the steam cleaner into one of the plastic containers of Mirachem 500 cleaning solution. Spray the water (as steam) from the steam cleaner spray nozzle into the sanitary sewer until the Mirachem 500 cleaning solution starts coming through.

5.11 Spray the Mirachem 500 cleaning solution from the steam cleaner spray nozzle back into its plastic container until the Mirachem 500 cleaning solution reaches the boiling point (turns to steam). Do this for both containers of solution.

5.12 Steam clean with Mirachem 500 cleaning solution the channel locks to be used in the next step.

5.13 To steam clean the coupons with Mirachem 500 cleaning solution, hold each coupon by the uncontaminated end with the set of channel locks cleaned in the previous step. For the coupon that is to be cut for surface analysis coupons, hold it by the end away from the center punch mark. When spraying with the steam cleaner, let the coupon hang down from the channel locks over the one recovery containment system. With the steam cleaner sprayer held only a few inches away, thoroughly spray all the surfaces of the coupon with the Mirachem 500 cleaning solution for a minimum of fifteen (15) seconds to a maximum of twenty (20) seconds. Also monitor the thermocouple reading during the Mirachem 500 steam cleaning of that temperature indicating coupon and record the maximum coupon surface temperature noted.

5.14 While still holding the Mirachem 500 cleaned coupon with the channel locks, stand it on end by placing one end of the coupon in one of the grooves between a vinyl polyester pallet grid and the interstices of the vinyl polyester recovery containment system over which the coupon was being sprayed with the Mirachem 500 cleaner.

5.15 Repeat steps 5.13 and 5.14 for each coupon. When standing them on end to await the rinse phase, set them 2" to 3" inches apart.

5.16 After completing step 5.15, remove the screened suction line of the steam cleaner from the Mirachem 500 cleaning solution container. Connect the suction line of the steam cleaner to the water supply. Spray the existing Mirachem 500 cleaning solution from the steam cleaner into the vinyl polyester recovery containment system used for the Mirachem 500 cleaning until all the Mirachem 500 cleaning solution has been pumped through. Then spray water from the steam cleaner spray nozzle into the sanitary drain until it reaches the boiling point (turns to steam).

5.17 Steam rinse the channel locks to be used in the next step.

5.18 To steam rinse the coupons, with the channel locks rinsed in step 5.17 remove each coupon by the uncontaminated end from the groove of the pallet grid of the vinyl polyester recovery containment system. For the coupon that is to be cut for surface analysis coupons, remove it by the end away from the center punch mark. When spraying with the steam cleaner, let the coupon hang down from the channel locks over the recovery containment system used for the Mirachem cleaning. With the steam cleaner sprayer held only a few inches away, thoroughly spray all the surfaces of the coupon for a minimum of fifteen (15) seconds to a maximum of twenty (20) seconds. When spraying is partially complete, momentarily place the coupon in a groove between a pallet grid and the interstice of that recovery system. Lift the coupon again with the channel locks shifted a few inches on the coupon to expose the coupon area previously covered by the channel locks. Complete the steam rinse spraying of that coupon. Also monitor the thermocouple reading during the steam rinsing of that coupon and record the maximum coupon surface temperature noted.

5.19 While still holding the steam rinsed coupon with the channel locks, stand it back on end in a groove between the vinyl polyester pallet grid and the interstices of the previously unused vinyl polyester recovery containment system.

5.20 Repeat steps 5.18 and 5.19 for each coupon. When standing them on end to dry, set them 2" to 3" apart.

5.21 Allow the coupons to air dry. Only use the electric hot air dryer if the humidity is so high as to prevent rapid drying of the coupons.

5.22 After the coupons are thoroughly dry, place a dust/mist respirator over one's mouth and nose. Just before handling the coupons, put on clean Nitrilite gloves. Be careful not to touch the outside of the gloves with the hands. While wearing the respirator and the gloves, wrap all of the coupons in a piece of Ameristat plastic laid on a cart with the inside surface of the roll turned upward. Fold the plastic over the coupons for protection and carry them to a darkened lab room.

5.23 Dispose of the Mirachem 500 cleaning/rinse condensed steam liquid by flushing it into the sanitary sewer as allowed by the MSDS for this product.

5.24 Excluding the coupon with the thermocouple attached, blacklight inspect all coupons for hydrocarbon contamination as follows:

5.24.1 Turn on and warm up the blacklight for a minimum of five (5) minutes.

5.24.2 The examiner shall be in the darkened area for at least five (5) minutes to allow time for eye adaptation to the darkness prior to viewing the coupon surfaces. If the examiner wears glasses or lenses, they shall not be photosensitive.

5.24.3 Confirm the maximum distance at which the blacklight produces 800 $\mu w/cm^2$ on the examination surface using the blacklight meter.

5.24.4 Put on new clean Nitrilite gloves before handling any coupons in the darkened area.

5.24.5 In the darkened area, blacklight inspect all surfaces of all coupons. During the inspection, hold the blacklight no further or no closer from the examination surface than the distance established in step 5.24.3. Use extra care when inspecting the previously contaminated center punched surface of each coupon.

5.24.6 If the blacklight inspection reveals no hydrocarbon contamination (no fluorescent glow at 800 $\mu w/cm^2$) on the surfaces of the coupons, proceed to step 5.25. If the blacklight inspection reveals residual amounts of hydrocarbon contamination, void this cleaning method procedure as inadequate.

5.25 Package and ship the forty eight (48) hydrogen outgassing coupons to Larry Jones at Caltech and the forty ninth (49th) coupon with extra center punch marks to Rainer Weiss at MIT in accordance with the Caltech instructions given as follows:

CBI

DOC. ID CLCOUPA1
REV. NO. 1
CONTRACT 930212

TITLE CLEANING OF PLAIN COUPONS
BY ALTERNATE METHOD #1
FOR SURFACE ANALYSIS AND OUTGASSING TEST
CALTECH

5.25.1 Place a piece of Ameristat film on a bench with the inside surface of the roll turned upward to provide a clean work surface.

5.25.2 Handle all coupons and film only when wearing dust/mist respirators and clean Nitrilite chemical resistant gloves.

5.25.3 Wrap twelve (12) hydrogen outgassing coupons to a bundle. In a separate bundle wrap the single coupon from which the surface analysis coupons will be cut by MIT.

5.25.4 Keep the inside surface of the film roll toward the inside surface of the package being wrapped. Limit film handling to outside edges only.

5.25.5 Wrap coupons with at least two (2) layers of film so that the outside edges do not come in direct contact with the coupons. Accomplish this by rolling the film around the short dimension of the coupons or coupon. Then fold the outer edges of the film to the middle.

5.25.6 Secure the film around the bundle with two (2) or more electrical tie wraps.

5.25.7 Label each bundle with the date wrapped, the identification of the cleaning procedure used to clean the coupons and the maximum coupon surface temperature noted during either the cleaning or the rinsing phase.

5.25.8 Pack the wrapped 0.115" x 1" x 18" hydrogen outgassing coupon bundles in a corrugated box. Add filler material as necessary for protection against possible shipping damage.

CBI

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CALTECH

5.25.9 Label this box and ship these hydrogen outgassing coupons via Airborne, Fedex or UPS to:

California Institute of Technology
Attention: Larry K. Jones 102 - 33
Pasadena, CA 91125

5.25.10 In a second corrugated box pack the single coupon for cutting into surface analysis coupons. Add filler packing material as necessary for protection against possible shipping damage.

5.25.11 Label this box and ship these surface analysis coupons via Airborne, Fedex or UPS to:

Attention: Rainer Weiss
Room 20B145
Massachusetts Institute of Technology
18 Vassar Street
Cambridge, MA 02139