



1. 18004-Attachment A - Piping Pressure Test Report.
2. 18004-Attachment B - Passivation Log Sheet.
3. 18004-Attachment C - Examination and Test Requirements.
4. 18004-Attachment D - Welding Inspection Log

#### 1.04 SUBMITTALS

- A. For the purpose of engineering checkout and validation, the Contractor shall provide the following:
1. Welding certification and inspection records.
  2. Cleaning and passivation certification.
  3. Pressure test certification.
  4. Surface finish certification.
  5. Insulation certification.
  6. Drainability test results (line slope verification).
  7. Isometric and orthographic piping as-built drawings.
  8. As-built P&ID drawings.

#### 1.05 QUALITY ASSURANCE

- A. All work within the scope of this specification shall be performed in accordance with this specification and all applicable referenced documents. No deviations shall be made from this specification or any applicable referenced documents, without the prior written authorization of the Owner or his Representative for each deviation. The application for each deviation shall completely and specifically define the location of, the nature of, and the reason for the proposed deviation.
- B. In general, fabrication, of any part may be prefabricated at a pipe fabrication shop or at an on-site pipe shop at the option of the Contractor subject to the approval of the owner or his Representative provided pre-assembly does not conflict with erection requirements and sequence of erection hereinafter specified. All drawings required for shop fabrication shall be the responsibility of the Contractor. Owner reserves the right to inspect all shop facilities prior to and during fabrication.
- C. It shall be the fabricator's responsibility in dimensioning and fabricating assemblies as shown on the piping drawings. Piping drawings are drawn to scale, but do not show all weld symbols.
- D. All dimensions and locations of piping shall be field verified prior to fabrication and erection to assure accuracy and freedom from interferences. Slopes are critical and cannot be compromised.

- E. The Contractor shall make allowances for normal field corrections which should be expected for this type of project. The Owner will not pay extras for field corrections except for the amount of material and labor by which the final “as-built” configuration exceeds that shown on the drawings. No extras will be paid for any portion of additional work required because of the Contractor's failure to field check dimensions and finalize penetration locations prior to fabrication.
- F. The Contractor shall allow for field fit-up of tubing in order to align with final locations of drilled concrete core holes or chases.
- G. The Contractor shall obtain clearance from the Owner's plant site personnel prior to drilling, cutting, or welding any existing structures, piping, or equipment. The Contractor shall consult with the Owner's plant site personnel prior to drilling into walls to assure that there are not embedded interferences.
- H. All wall and floor penetrations shall be filled/sealed by the Contractor per Architectural Finish Specifications
- I. Where noted on drawings, the piping layout design shall allow for future installation of automated equipment, e.g. space for actuators on manual valves.
- J. Contractor shall generate isometric spool drawings for all sanitary process systems (Specifications S3 and S4) and submit them to Owner for approval prior to fabrication.

#### 1.06 TUBING MATERIALS STORAGE AND HANDLING

- A. Tubing materials shall be identified in accordance with the applicable ASTM specifications and inspected, controlled, and protected in a manner that will assure the proper identification of all materials and conformance with the applicable codes and specifications.
- B. All incoming materials for use in sanitary tubing systems, including valves and instruments, shall be placed in quarantined areas for inspection and release, per Owner approved procedures.
- C. Where the Contractor is furnishing tubing materials, such materials shall be delivered in a clean and protected condition. End seals of tube, flange covers, valve covers, and similar protection shall not be removed until necessary for fabrication or erection.
- D. Care shall be exercised in the handling and storage of all tubing materials, including prefabricated and pre-assembled tubing, to prevent contamination by grease, moisture, chloride, carbon steel, or foreign matter and to avoid physical damage.

- E. Tubing and fittings should preferably be stored indoors. However, if temporary outdoor storage is necessary, all tubing and fittings shall be fully wrapped in polyethylene film, and sealed with waterproof tape.
- F. A chloride-free marking medium shall be used for identification or marking of stainless steel tubing materials. Marking medium shall be independently certified to contain less than 200 ppm total halogens. No paint is to be used for identification or marking of stainless steel sanitary tubing.
- G. Handling procedures which include the above listed criteria shall be developed by Contractor and submitted to Owner for approval prior to receiving materials of any kind.

#### 1.07 SPECIFICATIONS

- A. All specifications, standards, codes, etc., referred to and designated herein, together with all addenda, revisions, and supplements, shall be considered part of this specification. Specifications, standards, codes, etc., referred to shall be of the latest edition.
- B. All materials, fabrication, assembly, testing and inspection of the tubing systems within the scope of this specification shall be in accordance with the ASME Code for Pressure Piping B31.3; Local Codes, 3A FDA Sanitary Standards, and the contract piping materials specifications.
- C. All conflicts between the requirements of this specification, related specifications, standards, purchase orders or design drawings shall be referred to the Owner or his Representative for clarification before proceeding with work on the affected parts.

#### 1.08 SPECIAL FABRICATED MATERIALS

- A. ASTM A36 carbon steel material shall be used for all structural and support components except as otherwise indicated in the purchase order or the design drawings.
- B. Exposed supports in clean areas shall be fabricated from stainless steel structural shapes, in lieu of carbon steel.

### PART 2 PRODUCTS

#### 2.01 FABRICATION - GENERAL REQUIREMENTS

- A. Where specific details of fabrication are not shown on the drawings or specified, fabrication shall be in accordance with the requirements of the Code for Pressure Piping, ASME B31.3.

- B. Dimensional tolerances on prefabricated tubing assemblies supplied or fabricated by the Contractor shall be in accordance with Pipe Fabrication Institute Standard ES-3. Dimensional tolerances for automatic welding fittings shall be in accordance with the applicable piping materials specified in Section 18001 - Specification for General Piping Requirements.
- C. Prefabricated tubing shall provide sufficient field welds to permit the completion of terminal connections without strain on equipment or piping. Piping should not require connection to equipment for support. Provide sufficient external supports. Refer to Section 18005 - Specification for Piping Supports for guidance.
- D. All tubing material shall be identified. Mill certificates and copies of purchase orders are required for all stainless steel tubing, fittings and valves. Materials shall be marked in such a way that they are easily traceable to their corresponding mill certificates. No material of unknown specification or reclaimed material shall be used.
- E. All completed tubing systems shall be permanently labeled to indicate fluid service and direction of flow.
- F. All sanitary tubing joints are to be welded, except fittings immediately adjacent to equipment or valves that must be removed for maintenance, or sections of tubing that may require removal for cleaning. Tubing clamps, per material specification, shall be used at these points.

## 2.02 LAYOUT, CUTTING AND FITTING UP

- A. All sanitary tube ends to be welded shall be deburred and have square cut edges, free of shear radii at the edges and free of embedded grinding wheel grains.
- B. The cutting tool employed shall be of a type that will not alter the ovality tolerances stated in the materials specification and give minimum burring while attaining a square cut.
- C. The cut end of the tube shall be checked to ensure that the cutting tool is cutting squarely.
- D. Burrs shall be removed in such a manner as to not bevel ID or OD, or damage the polished interior surface of the tubing. Use of a specially developed end-prep tool is recommended to both debur and square ends to be welded.
- E. Any abrasive dust that has accumulated should be wiped clean, and completely removed from tubing subassemblies prior to installing them in the system.
- F. All tools, wire brushes, etc., that are to be used in the fabrication and erection of sanitary tubing must be compatible stainless steel not used on carbon or low alloy steels, or stored with tools used on metals other than stainless steel. There should be no contamination with dirt, sulfur or halogen bearing material.

- G. All rollers used in the fabrication and erection of sanitary tubing must be stainless steel.

## 2.03 WELDING PROCEDURES AND QUALIFICATIONS

- A. Refer to Section 18003.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. All sanitary tubing lines are to be sloped as indicated on drawings to provide for complete drainage. Unless otherwise directed, a minimum slope of 1:200 shall be maintained.
- B. Drain lines shall be as short as practical.
- C. Sanitary diaphragm valves shall be installed at the proper manufacturer specified free-draining angle, unless otherwise directed.
- D. Deadlegs shall not exceed six (6) times branch pipe internal diameter in length, as measured from the centerline of the main to the midpoint of the branch valve. Deadlegs of three (3) times L/D are preferred. Consult P&ID drawings for indications where these conditions are particularly critical.

### 3.02 WELDED JOINTS

- A. All welded joints shall be prepared and made in accordance with Section 18003.
- B. In general, all production welds for joints in sanitary tubing systems are to be made using programmable orbital welding machines in accordance with an approved welding procedure.
- C. For welding process in which filler wire or other types of consumable electrodes are used, the following material is required:

1. Base Material	Filler Material
304L	308L
316	317, 317L
316L	317L
317L	317L

- D. Shielded metal arc welding (SMAW), or stick welding, is specifically prohibited.

### 3.03 MECHANICAL JOINTS (FERRULES)

- A. All mechanical joints shall be made with new gaskets as specified and new clamps of uniform material as specified.
- B. Care shall be taken to assure that all gaskets are properly positioned prior to tightening of the clamps.
- C. Care shall be taken to avoid overtorquing any bolts. All bolts and nuts which are overtorqued shall be replaced.

### 3.04 SUPPORTING OF TUBING

- A. All tubing supports are to be located and installed by Contractor.
- B. In general, supports for tubing are only shown on drawings when special conditions must be met. Such supports will be located on the piping drawings.
- C. Supports for sanitary tubing shall be fabricated, and installed in accordance with the details and parameters established by the pipe support Vendor, and in accordance with Section 18005 - Specification for Piping Supports.
- D. In general, sanitary tubing should be supported to allow flexibility to accommodate thermal expansion. Limit stops, anchors, and guides may be required at changes in direction and other locations to control flow-induced movement.
- E. All exposed supports in the sterile and ultra-clean areas shall have a polished finish, not to exceed 35 Ra roughness.
- F. Where tubing passes through walls, ceilings, and floors, clearance is required around the tube to allow it to move during contraction and expansion. Approved grommets or penetration seals may be required.
- G. Sanitary tubing shall be supported in such a manner as to allow the line to slope as shown on LSI piping drawings. If no slope is specified, the absolute minimum requirements for drainability is 1:200.

### 3.05 INSPECTION AND TESTING OF TUBING

- A. All fabricated tubing shall as a minimum meet the examination, inspection and testing requirements as in Section 18003.
- B. Sanitary tubing will require 100 percent visual inspection of all welded joints.

- C. Contractor shall make available to the inspector a boroscope or video boroscopic equipment for visual inspection of the weld ID of sanitary tubing.

### 3.06 PRESSURE TESTING

- A. As far as is practicable, all pressure tests shall be complete system tests conducted in the presence of the Engineer or Owner's Representative.
- B. Every precaution shall be taken during testing to ensure the safety of the test operator and other personnel working in the area. Systems to be pressurized shall be provided with appropriate gauges and pressure relieving devices.
- C. All joints, including welds, are to be left uninsulated, unpainted, and exposed for examination during testing.
- D. Pressure gauges shall not be subjected to pressure in excess of their scale range. All pieces of equipment which do not have their test pressures indicated or whose test pressures are below the tubing system test pressure shall be excluded from these tests.
- E. Equipment and/or instrumentation which is not to be subjected to the pressure test shall be either disconnected from the tubing or isolated by blinds or other means during the test. Valves may be used provided they are suitable for the proposed test pressure.
- F. Before every test the tubing systems shall be inspected by the Contractor to assure that there are no visually obvious defects and that all connections are tight.
- G. Control valves, unless being used as system boundaries, shall be set and maintained in the open position.
- H. Lines containing check valves shall have the pressure applied upstream of the check valve so that pressure is applied under the seat.
- I. All in-line instruments, gauge glasses, flow meter pots, liquid level float gauges, and all other pressure parts of instruments shall be included in these tests, where feasible.
- J. Joints found to be defective shall be repaired and retested at no additional costs to the Owner.
- K. Retesting of lines after repairs shall be done at pressure and duration originally specified for the test.
- L. At the completion of the test; all blinds, caps, etc., used to isolate vessels, instruments, etc. shall be removed; ferrules shall be inspected to insure no damage and reconnected. Gaskets



removed after tests shall not be reused. Special care shall be exercised when reconnecting these points to avoid leaks.

### 3.07 TEST REPORTS AND PROCEDURES

- A. The Contractor shall make a record of the test on the attached "Piping Pressure Test Report" Attachment A, or other approved test form for each tubing system tested which shall consist as a minimum of the following data:
  - 1. Line designation number
  - 2. Date of test
  - 3. Type of test, pressure applied, and length of time at test pressure
  - 4. Tested by
  - 5. Tests witnessed by (Owner's Representative).
  - 6. Comments, if any
- B. A written Safe Work Procedure shall be submitted by the Contractor for approval by the owner or his Representative prior to beginning of Pneumatic tests if the test pressure is to exceed 1.7 BAR (25 psig). The procedure shall cover a minimum of the following items: Pretest visual inspection, areas to be roped off, time schedule for incremental pressure increases, and indoctrination of personnel on hazards on hazards involved, facilities at site for medical care, and fire fighting in case of an emergency.
- C. Owner's Representative shall signify his acceptance of the tested system by initialing the approved portions of the tubing system on the Constructor's record of test, and by any other definite means mutually agreed upon.
- D. All tests shall be performed using a certified pressure gauge having a minimum face diameter of 76mm (3") and in current calibration. The scale range of the test instrument used for any particular test shall be such that the required test pressure falls between 1/3 and 2/3 full scale reading for best accuracy.

### 3.08 HYDROSTATIC TESTS

- A. The hydrostatic test pressure shall be calculated in accordance with the applicable section of ANSI B31.3 but shall not exceed the maximum test pressure of any vessels or components included in the test.
- B. All hydrostatically tested systems shall be tested to one and one-half (1-1/2) times the design pressure or to a minimum pressure of 3.4 BAR (50 psig) whichever is greater. Design pressure is defined herein as the maximum operating pressure shown on the "Service Listing" of Section 18001 - General Piping Requirements. All test pressures shall be maintained for a minimum of

ten (10) minutes before examination of joints begins. All joints shall be visually examined for any signs of leakage.

- C. When design temperatures are greater than test temperatures, adjustments shall be made in accordance with ASME B31.3, Paragraph 345.4.2.
- D. Hydrostatic test pressures shall not be applied until the tubing system and the testing medium have reached thermal equilibrium. Pressure shall be applied in reasonable increments until specified test pressure is attained.
- E. When setting the system test pressure, the test gauge shall be monitored and corrections made to compensate for any pressure changes due to thermal expansion or contraction. By this procedure the test pressure shall be kept within 0.34 BAR (5 psig) or one (1) percent, whichever is greater, of the intended value. After the test pressure is set, the pressure source shall be disconnected from the fill point, prior to examination of joints.
- F. Tested systems shall be vented and drained immediately upon successful completion of the test. All process and solvent lines shall be dried by passing inert gas through them until they are dried to the satisfaction of Engineer.
- G. No repair welding shall be done on any section of tubing that contains water.
- H. Water used for testing sanitary austenitic stainless materials shall be essentially free from chloride. R.O. or demineralized water shall be used.
- I. All stainless steel lines shall be emptied and dried immediately after hydrostatic test are completed.
- J. For hydrostatic tests, every precaution shall be taken for the removal of trapped air. The Contractor shall be responsible for proper venting of piping systems (and vessels when required) while cleaning and testing, and after testing, while draining, to ensure against collapse by vacuum.
- K. The Contractor shall be responsible for the removal of water used in testing piping systems.

### 3.09 PNEUMATIC TESTS

- A. Air tests, when specified, shall be performed with clean, dry air, or nitrogen, as required by process consideration. The source shall be equipped with appropriate pressure regulator, relief valves and gauges.

- B. Air tests shall be performed at the test pressure specified in the Examination and Testing Requirements Tables. If not specified, the test pressure shall be in accordance with the applicable section of ASME B31.3, nominally 110 percent of design pressure.
- C. Pneumatically testing systems shall include a preliminary check at not more than 1.7 BAR (25 psig). The system shall then be brought up to test pressure in 0.7 BAR (10 psig) increments. Enough time shall be allowed for thermal equilibrium at each incremental step up to and including the final test pressure.
- D. The pressure source shall be disconnected from the test apparatus fill connection prior to examination for leakage. All joints shall be inspected with an approved solution formulated for soap bubble testing.
- E. The system under test shall hold the test pressure, with no indication of pressure loss according to the test gauge, for a minimum period of one (1) hour prior to formal inspection of joints.
- F. Tested systems shall be vented immediately upon successful completion of the test.
- G. No repair welding shall be performed on a pressurized system.
- H. Where both hydrostatic and pneumatic tests are run on a section of pipe, the pneumatic test shall precede the hydrostatic.
- I. On tested systems which do not complete their test successfully, the leaks shall be located, marked, and repaired immediately after depressurizing the test section. Tested systems which fail the pressure test and have been repaired, shall be retested using original test pressures and procedures.

### 3.10 VACUUM TESTING

- A. System requiring a vacuum test shall be tested by the following procedure:
  - 1. The system shall receive a preliminary pneumatic pressure test at a minimum internal pressure of 1BAR (15 psig) in accordance with Section 3.09 of this specification.
  - 2. The system shall be given an operational vacuum test using the operating vacuum pump or a special test pump. The system shall be considered acceptable if a vacuum of 508mm (20") Hg (0.35 BAR) is maintained for a period of four (4) hours and if the pressure does not rise more than 25mm (1") Hg (0.03 BAR) with the pump shut-off.
  - 3. If step 2. is not successful, the system shall be retested per step 1. to locate the leak, using soap and water at all joints, then repaired and given another vacuum test.

### 3.11 STANDING WATER TEST

- A. Systems operating at atmospheric pressure, such as process waste and vent lines, shall be tested by the following procedure:
  - 1. All portions of the system under test shall be completely filled with water. Care shall be taken to eliminate all air pockets. A considerable amount of time is sometimes required for this step, especially if soluble paper dams have been used for inert gas purge.
  - 2. Water shall stand for a period of not less than two (2) hours, prior to inspection of joints.
  - 3. If the system loses water, leaks shall be located and repaired, and the system retested.

### 3.12 SYSTEM CLEANING AND FLUSHING

- A. The interior of all tubing shall be free of any foreign material, including all purge dam materials, and meet the parameters specified in Section 18001-S4.
- B. After erection and welding of tubing, lines which have completed hydrostatic testing shall be flushed with clean low chloride water. The test shall be conducted in the presence and to the satisfaction of the Owner or his Representative.
- C. After erection and welding of tubing, all lines which have completed pneumatic testing shall be blown free of dirt and debris with clean, dry air to the satisfaction of the Owner or his Representative.
- D. When flushing has been completed, lines shall be drained, strainers shall be cleaned and replaced and any temporary connections, valves or related items shall be removed. Tubing systems shall be placed in normal operating condition including necessary adjustments that may be required to the system.
- E. System flushing may be performed before or after hydrostatic testing, but shall be completed prior to any passivation is performed.

### 3.13 PASSIVATION

- A. All welding and pressure testing of system and/or components shall be completed prior to passivation.
- B. Passivation is a process by which a solution of a mineral or organic acid in water, in combination with a wetting agent or detergent or both, is employed to remove iron and other metallic contamination, light oxide films, shop soil, soluble salts, and other corrosion products, leaving a chromium-rich surface for increased corrosion resistance.
- C. Current industry practice is to use the nitric acid passivation process. However, the Owner has the option to request and approve alternative processes which may provide satisfactory results.

- D. Contractor shall submit and have approved his detailed procedures for the passivation of all sanitary tubing and equipment delineated on the flow diagrams prior to commencing work.
- E. The procedure shall name chemical ingredients and detergents, etc., by name and/or chemical formula.
- F. The procedure shall name the strength/concentration of all solutions to be circulated in tubing systems, and also the temperature, pressure, and duration of use.
- G. An adequate supply of demineralized or R.O. water must be available on-site for solution make-up and flushing. Contractor to verify the source and supply of water with the Owner.
- H. The final post-acid treatment rinse is to be done with demineralized water. Owner's Representative may verify water quality by sample analysis.
- I. Sanitary tubing systems to be passivated may be joined in series by flexible hoses in order to effect economies, but on no account may be split and run in parallel.
- J. All systems that have been passivated must be thoroughly dried using clean, oil-free, dried, filtered air, then capped or reconnected to the tubing system.
- K. Passivation data to be recorded and initialed on Passivation Log Sheet. (Attachment A).
- L. Detergent, water rinse, and passivating agent shall not enter processing equipment unless otherwise noted. Sanitary clamp connections at inlet nozzles to equipment are to be broken, and connected with hoses which will be run to drains (for rinsing step) or to acid-resistant collection containers (for detergent wash and passivation). All tanks and equipment are assumed to be passivated by the manufacturer unless included in the passivation system as shown on flow diagrams. Pumps should be passivated with the piping system. Tubing will be re-connected to equipment upon completion of passivation procedure.
- M. Contractor shall identify sanitary tubing system from the flow diagrams and use it in a sample procedure, detailing all the steps to be taken from start to finish to render these systems passivated in accordance with this specification. The sample procedure should also detail any additional work the Contractor deems necessary, desirable, or is part of his standard operating procedures to achieve the required results.

### 3.14 SAFETY

- A. The chemicals used in passivation procedures are dangerous. Precautions shall be taken to protect all personnel, equipment and facilities. Boots, rubber suits, rubber gloves, rubber head coverings, goggles, face masks and respirators shall be available to Contractor and Owner

personnel as required. Contractor shall ensure that adequate safety showers and eye wash stations are provided.

B. In addition to the above, the Owner's site safety rules shall be complied with.

C. Waste Disposal

1. Federal, state and local pollution control regulations must be complied with. Contractor shall consult with Owner on approved methods of disposing of large volumes of chemical solutions.

### 3.15 QUALITY ASSURANCE

A. The Contractor shall maintain all records of field fabrication including records of fabrication steps and all tests and inspection data and all records of passivation process including records of passivation steps - recorded and initialed on Passivation Log Sheet. (Attachment B).

B. General

1. The Contractor shall have, maintain and utilize a quality control system which will establish that all contractual requirements are met. This shall include requirements for material, fabrication, welding, erection and examination procured and/or performed by the Contractor; and material and/or inspection provided by the Owner.
2. A written description of the quality control system shall be developed and submitted for review and acceptance by Construction Manager before work is commenced.
3. The necessary scope and details of the system shall be a function of the complexity and size of the work to be performed and the circumstances of the Contractor's organization but as a minimum cover the features hereinafter outlined. This information will be treated as confidential and of proprietary nature, and will be returned to the Contractor at the conclusion of the project.
4. The authority and responsibility of those administering and performing the activities of the quality control system shall be delineated clearly. Persons performing quality control functions shall have sufficient and well-defined responsibility, the authority and the organizational freedom to identify quality control problems, and to initiate, recommend and provide solutions.

C. The Quality Control System

1. An organization chart showing the relationship between management, purchasing, receiving, document control, supervision, fabrication (and welding), pipe fitter labor, non-destructive examination (NDE), inspection and quality control is required to identify the actual portion of the organization with the particular function for which it is responsible.
2. The Contractor shall have a system of material control which will insure the following:

- a.. That the proper material is ordered.
  - b. That the correct material has been received.
  - c. That the material is identified properly.
  - d. That documentation (material certifications and/or mill test reports) when required, are received and validate the material satisfactorily.
3. The Contractor shall have a quality control system that indicates that fabrication, welding and erection conform to specification requirements and ANSI/ASME B31.3 - 1994 Edition. This shall include examination and inspection to verify that contractual requirements have been met.

**END OF SECTION**

Test Number:.....Date of Test:.....

Line No. or System.....

Test Medium: .....Client/Contract No.....

Test Pressure: .....Test Gauge ..... Calibration Date:.....

Test Start Time .....Test Pressure Hold Time: .....

Leaks Identified .....Repaired & Retested.....

Test Complete Time .....System Depressurized .....Initial.....

### CHECK LIST AFTER PRESSURE TEST

	Completed	Date	Not Required
System Drained	( )	.....	( )
System Air Dried	( )	.....	( )
Temporary Equipment Removed Such As:			
Pressure Gauges	( )	.....	( )
Blind Flanges, Caps, Test Plugs, Hoses, etc.	( )	.....	( )
Safety and Relief Valves			
Installed/Functional	( )	.....	( )
Valving Return to Proper Configuration	( )	.....	( )

Remarks: .....

I certify this system to be leak-free and structurally sound on the test completion date.

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Test Engineer
Date

Field Superintendent \_\_\_\_\_ Date \_\_\_\_\_

System Accepted: \_\_\_\_\_  
Owner

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Date \_\_\_\_\_



**END OF ATTACHMENT A**

**ATTACHMENT B**  
**PASSIVATION OF 316L SANITARY TUBING**  
**PASSIVATION LOG SHEET**

Date: \_\_\_\_\_ Operator: \_\_\_\_\_ Supervisor: \_\_\_\_\_

Bldg: \_\_\_\_\_ System: \_\_\_\_\_ Line Nos.: \_\_\_\_\_

Procedure: Read \_\_\_\_\_ (O) \_\_\_\_\_ (S)

**I. Alkaline Rinse (1%):**

Alkali Used \_\_\_\_\_ Water Quality: \_\_\_\_\_

Volume of Alkali \_\_\_\_\_ Volume of Water: \_\_\_\_\_

Volume of 1% Solution: \_\_\_\_\_ Temperature: \_\_\_\_\_ °C (71°C)

Recycle Start: \_\_\_\_\_ Recycle Finish: \_\_\_\_\_

Total Time: \_\_\_\_\_

**II. City Water Rinse:**

Recycle Start: \_\_\_\_\_ Recycle Finish: \_\_\_\_\_

Total Time: \_\_\_\_\_ (15 minutes)

Remarks: \_\_\_\_\_

\_\_\_\_\_

**III. Acid Rinse:**

Acid Used: \_\_\_\_\_ Water Quality: \_\_\_\_\_

Volume of Acid: \_\_\_\_\_ Volume of Water: \_\_\_\_\_

Volume of Acid Solution: \_\_\_\_\_

Temperature: \_\_\_\_\_ °C (50-55°C or 20-38°C)

Recycle Start: \_\_\_\_\_ Recycle Finish: \_\_\_\_\_

Total Time: \_\_\_\_\_ (20-30 Minutes or 60 Minutes)

IV. **City Water Rinse:**

Recycle Start: \_\_\_\_\_ pH of Rinse: \_\_\_\_\_ (6-8)

Recycle Finish: \_\_\_\_\_

V. **Distilled Water Rinse:**

Volume of Distilled Water: \_\_\_\_\_

Rinse Start: \_\_\_\_\_

Rinse Finish: \_\_\_\_\_

Total Time: \_\_\_\_\_ (10 Minutes)

pH of Final Rinse: \_\_\_\_\_

\_\_\_\_\_  
Signature of Supervisor

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Plant Engineer

\_\_\_\_\_  
Date

**CAUTION**

**50% CAUSTIC (NaOH) IS DANGEROUS AND WILL SEVERELY BURN THE SKIN. DAMAGE TO THE EYE IS IRREPARABLE. FLUSH IMMEDIATELY WITH PLENTY OF WATER**

**NITRIC ACID WILL ALSO BURN AND IRRITATE THE SKIN. FLUSH IMMEDIATELY WITH PLENTY OF WATER.**

**RECYCLING AT 160° F INTRODUCES THE POTENTIAL HAZARD OF BURNS FROM THE HEATED SOLUTIONS.**

**PROPER PROTECTIVE CLOTHING, READILY ACCESSIBLE SHOWERS OR RUNNING HOSES, AND ON-SITE SUPERVISION SHOULD BE AVAILABLE DURING A PASSIVATION OPERATION.**

**END OF ATTACHMENT B**