

Title: SPECIFICATION FOR CLEANING PROCEDURE

**SPECIFICATION FOR
CLEANING PROCEDURE**

JAN 17 1997

FOR

LIGO VACUUM EQUIPMENT

Hanford, Washington
and
Livingston, Louisiana

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Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

REV LTR.	BY-DATE	APPD. DATE	DESCRIPTION OF CHANGE
2	TMS 1-16-97	REB DREW 1-16-97	ADDED DETERGENT DETAILS PER DEO 0414
1	GS 10-10-96	REB	Release for Fab Per DEO #0302
1	TMS 8-6-96	D. McW 8-6-96	ADDED ACETONE PRECLEAN AND UPDATED PROCEDURE PER DEO 0240
0	TMS 4-30-96	REB	GENERAL REVISION PER DEO # 0151

PROCESS SYSTEMS INTERNATIONAL, INC.					SPECIFICATION	
INITIAL APPROVALS	PREPARED	DATE	APPROVED	DATE	Number	Rev.
	T. Stan	4-30-96	REB	5/1/96	A V049-2-015 LIGO-ES970004-02-V	2

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SPECIFICATION FOR CLEANING PROCEDURE**1.0 PURPOSE**

The purpose of this procedure is to define the necessary steps for the cleaning of the LIGO vacuum equipment components such that all vacuum exposed surfaces are compatible with ultra high vacuum service.

2.0 GENERAL

This procedure is applicable to any fabricated stainless or aluminum component that is exposed to UHV service. It applies to the cleaning of these components subsequent to completion of all machining and welding operations.

3.0 RESPONSIBILITY

- 3.1 PSI Engineering is responsible for identifying all components and portions of components that are subject to this procedure. All cleaning will be as specified on the drawings.
- 3.2 PSI manufacturing is responsible for the execution of this procedure in the PSI shop.
- 3.3 The installation contractor is responsible for maintaining this procedure at the sites.
- 3.4 Quality Assurance is responsible for monitoring compliance with this procedure in the PSI shop. Engineering will be responsible for compliance at the sites.
- 3.5 This procedure shall be maintained and modified as required by the cognizant engineer.

4.0 EQUIPMENT AND SYSTEMS

- 4.1 The cleaning equipment consists of the following:
- 4.1.1 Washing Cabinet
 Enclosure
 Spray header system
 Drain collection system and pump
 Vent system
 Controls

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4.1.2 Cleaning Solution and Rinse System

- Wash water storage tank
- Rinse water storage tank
- DI Water system and storage tank
- Waste water hold-up tank
- Wash/Rinse water heater
- DI Water heater
- Pumps, filters, piping, valves

4.2 Clean Manufacturing Area

An isolated section of the PSI shop will be provided with an outside air purge to form a clean manufacturing space. Class 100 cleanrooms will be operated in this area. Because the air is recirculated through the cleanroom filters, it will also be cleaner than the shop atmosphere. It is expected that it may reach a level as low as Class 50,000 to 100,000. The components cleaned in the washing cabinet will be moved into the Class 100 cleanrooms for packaging (or closure of the vessel ports) without going back into the shop atmosphere.

4.3 Class 100 Cleanroom

4.3.1 Two Class 100 soft-wall portable cleanrooms are joined together to make a large working area. The cleanrooms circulate air through HEPA filters at the tops of the rooms downward. The air exits under the soft-walls (plastic curtains) at the bottom and recirculates through the room to the blower inlets at the top.

4.3.2 Cleanroom activities shall be performed in accordance with Cleanroom Procedure V049-2-118. Specific cleanroom training is required for anyone entering the cleanroom. This training, given by Manufacturing Engineering, covers principles, gowning and necessary behavior.

5.0 PROCEDURE

5.1 Starting Condition

- a.. All welding completed to the degree possible.
- b. Remove gross contamination from all interior and exterior surfaces (including flange faces) by steam cleaning with a portable steam system. Remove ink markings, such as material designations, with acetone.

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5.2 Equipment Set-Up

- a. Establish the proper level of DI water in the storage tank by running city water through the DI water system and into the tank
- b. If any water remains in the waste water hold-up tank, drain it to the waste storage tank. (Note: If the waste water is to be drained to the town sanitary sewer, testing and treatment may be needed before discharge.)
- c. Establish the proper level in the wash water tank, adding detergent and water pumped from the primary rinse tank as required. (The entire contents of the wash water tank should be drained every 2 months, or longer if the system is not used continuously. Also, see Section 5.7, below.)
- d. Establish the proper water level in the rinse water tank, adding DI water as required.
- e. Activate the wash/rinse water heater and circulate the wash water in a closed loop to heat the contents of the tank to approximately 150 F as read on the thermometer at the pump inlet. Repeat for the rinse water. Repeat for the DI water using its dedicated pump and heater.
- f. Confirm proper piping connections and valve lineup for the system.
- g. Confirm proper operation of the vent fan.
- h. Confirm proper operation of the cleanroom.

5.3 Cleaning Precautions

- 5.3.1 There shall be a minimum of two operators present (in the area) for all cleaning operations.
- 5.3.2 The operator doing the washing shall wear a lab coat, shoe covers and clean room gloves. (This applies to anyone handling the cleaned pieces.)
- 5.3.3 The operators should be familiar with the washing system and its components before operating the equipment.
- 5.3.4 Do not let any surface dry between start of washing and end of final rinse.
- 5.3.5 Handle each piece or component with appropriate care and clean gloves.

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5.4 Cleaning5.4.1 *General*

- a. The heater controls should be set to provide approximately 150 F water.
- b. When making DI water, periodically monitor the quality light at the DI system.

5.4.2 *Component Loading*

- a. Mount the component to be cleaned on a cart, and position in the washing cabinet.
- b. Assemble and position the spray headers as appropriate for the piece being washed.
- c. Install the turning machine. Run the turning machine and visually confirm proper rotation of the component and positioning of the spray headers.
- d. Close and secure the cabinet doors.

5.4.3 *Wash*

- a. Start the cleaning cycle (the vent fan will automatically start during drying). Note: The cycle should not be interrupted between steps.
- b. As the controller steps through the washing and rinsing steps of the cycle, periodically monitor the status of the pumps, valves, filters and tanks.

5.4.4 *Drying*

- a. Drying will be accomplished by blowing clean air over the component before allowing it to cool.
- b. Inspect and bag the component (or close up the vessel) as soon after drying as possible. Avoid contamination from unfiltered shop air through open doorways.

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5.5 Inspection

- a. Inspection shall be done (before removing the piece from the washing cabinet) using a black light on all interior surfaces or flange faces. No visible contaminant of any form shall be detected when viewed with the naked eye under both natural and ultraviolet light.
- b. The presence of any hydrocarbon or fingerprints on any interior surface or flange face shall be cause for rejection. This will require CO₂ cleaning to rectify.
- c. A visual inspection shall be made of exterior surfaces. Visible particulates or actual contamination shall be removed.

5.6 Bagging/Wrapping

- a. Immediately after drying and inspection, double bag the component using clean, oil-free polyethylene bags or wrap and seal using the same material.
- b. Remove the component to the clean area.

5.7 Wash Solution Maintenance

- a. The wash solution should be established and maintained at approximately 4% by volume of Inpro-Clean 1300 (manufactured by Oakite). On the filling of an empty tank, 20 gallons of the cleaner should be used with DI water to fill the tank to 520 gallons (just below the high level switch location).
- b. When adding water to the wash solution tank, either from the primary rinse tank or from the DI water system, one gallon of Inpro-Clean 1300 should be added for each 3" increase in tank level. Detergent need not be added for changes less than 3".
- c. Initially, and after the first week of frequent wash system usage (and periodically thereafter), a sample from the wash solution tank should be taken and analyzed for detergent concentration by titration using the test kit for Procedure 125. For Procedure 125, the sample volume is 2 ml and the detergent volume percent concentration is $T \times 3.6$ (see instructions in kit). This will assure maintenance of the proper detergent concentration.

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- d. The entire contents of the wash water tank should be drained every 2 months, or longer if the system is not used continuously. If not changed periodically, the detergent will become ineffective. There is no indication of this condition other than the loss of adequate cleaning (as indicated by the RGA vacuum test).

6.0 REQUIRED DOCUMENTATION

A component cleaning data sheet containing the following data shall be filled out on completion of cleaning. The data sheet will become part of the component QA package.

- Cleaning log describing parts cleaned and procedure used
- Comments and observations
- Record of flow rates, temperatures and durations used
- Record of inspection results

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SPECIFICATION FOR CLEANING PROCEDURE

Attachment

LIGO COMPONENT CLEANING DATA SHEET

Project V59049

Component

Serial Number

_____	_____
_____	_____
_____	_____
_____	_____

Wash Cycle: _____

Flowrates: _____ Max. Temp.: _____ Duration: _____

Operator: _____ Date: _____

Comments: _____

Component(s) Inspected By: _____ Date: _____

Quality Assurance: _____ Date: _____

Comments: _____

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Oakite[®] **INPRO-TECH** **METAL CLEANING & RUST** **PREVENTION MANAGEMENT**

Oakite's *INPRO-TECH* Series is a family of products and programs designed for In-process metal fabrication applications. Product lines utilizing Oakite's In-process metal cleaning, rust protection and process management technology include:

- INPRO-CLEAN** - Cleaners
- INPRO-TECT** - Cleaner/Rust Inhibitors
- INPRO-GUARD** - Rust Preventives

INPRO-CLEAN 1300: Heavy-Duty, Non-Silicated Multi-Metal* Cleaner

DESCRIPTION:

Inpro-Clean 1300 is a low-foaming, mildly alkaline liquid cleaner for In-process metal fabrication and pre-finishing operations. Its exceptional cleaning ability removes difficult soils such as polishing and buffing compounds as well as stencil ink, drawing compounds, oils, greases and metalworking fluids. Inpro-Clean 1300 is a non-silicated, non-caustic cleaner with the versatility of multi-metal* safety and the heavy-duty detergency required for ferrous-metal cleaning.

APPLICATIONS:

Inpro-Clean 1300 is well suited for the In-process cleaning of drawing compounds, oils, greases and metal-working fluids in spray washers. It is also effective in the removal of polishing and buffing compounds.

Inpro-Clean 1300 is ideal for use in pre-finishing processes. It can be used as a pre-phosphate cleaner on multi-metals* where carry-over concerns and rinsing limitations require a non-caustic material. When desired, a slight etch of aluminum and galvanized steel can be obtained through increasing the operating parameters. Inpro-Clean 1300 is recommended for cleaning aluminum prior to phosphate or chromate conversion coatings where a slight etch without smut is desired. It also is ideal for cleaning galvanized steel where the high etch rate of caustic cleaners creates disposal problems due to the volume of zinc dissolved.

Inpro-Clean 1300 can be used in spray washers and agitated tanks. All applications should be followed by a rinse.

FEATURES & BENEFITS:

Non-Silicated	Eliminates silicate drydown which can interfere with subsequent operations.
Non-Emulsifying	Floats oils allowing skimming to extend tank life and facilitate disposal.
Mildly Alkaline, No Heavy Metals	Safer employee handling, facilitates disposal.
Effective in Hard Water	Minimizes scale and sludge formation
Non-Caustic	Eliminates caustic burns and drydown and allows easy rinsing.
Low-Foaming	Suitable for high pressure washers and agitated tanks.
Liquid Form	Allows for easy automatic dispensing and control.
Free Rinsing	Reduces alkaline carry-over into subsequent stages.

CHEMICAL CHARACTERISTICS:

Inpro-Clean 1300 is a solution of phosphates, sequestrants and surfactants.

pH, as used - 9.5 - 10.2
Bulk Density - 10.1 lb/gal

METAL SAFETY:

- Safe on most metals except magnesium. Inpro-Clean 1300 may discolor brass and other cuprous alloys. Slight etching on aluminum and zinc alloys may occur at higher temperatures and/or concentrations. Results on aluminum, zinc and cuprous alloy should be verified prior to use. Note 2024 aluminum alloy may etch at a higher rate.

OPERATING PARAMETERS:**Spray Washer:**

Ferrous Metals:
Concentration - Up to 5% by volume
Temperature - 120 - 160°F
Time - ½ to 3 minutes

Agitated Immersion Application:

Concentration - Up to 10% by volume
Temperature - 100-160°F
Time - 1 to 5 minutes

For operating parameters on aluminum alloys and cuprous alloys please contact your Oakite Technical Sales Representative.

PROCESS CONTROL:

Concentrations are titrated using either procedures 56 or 125. For Procedure 56 the sample volume is 25 ml. $T \times 2.9 = \% \text{ by volume of Oakite Inpro-Clean 1300}$. For Procedure 125 the sample volume is 2 ml. $T \times 3.6 = \% \text{ by volume of Oakite Inpro-Clean 1300}$.

SAFETY PRECAUTIONS:

See Material Safety Data Sheet

DISPOSAL METHODS:

Dispose in accordance with federal, state and local regulations.

PACKAGING:

Non-returnable 55 gal poly drum, gross wt. 578 lbs., net wt. 555 lbs.
Bulk shipments are available

SHIPPING:

Common carrier, freight classification J - "Cleaning Compound, NOIBN Liquid"
Product Code 4401

STORAGE:

Not affected by high or low temperatures. Freezing point is 32°F. If freezing occurs, simply thaw and use.

Oakite Products, Inc. warrants that the product or products described herein will conform with its published specifications. The products supplied by Oakite and information related to them are intended for use by buyers having necessary industrial skill and knowledge. Buyers should undertake sufficient verification and testing to determine the suitability of the Oakite materials for their own particular purpose. Since buyer's conditions of use of products are beyond Oakite's control, Oakite does not warrant any recommendations and information for the use of such products. OAKITE DISCLAIMS ALL OTHER WARRANTIES INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE IN CONNECTION WITH THE USE OF ITS PRODUCTS.

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4401

Oakite[®] MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 4401
 OAKITE INPRO-CLEAN 1300
 60-KB-21

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SECTION I - PRODUCT IDENTIFICATION

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TRADE NAME	OAKITE INPRO-CLEAN 1300	EMERGENCY TELEPHONE NUMBER:
CHEMICAL NAME AND SYNONYMS	NA; Mixture	(800) 424-9300 (CHEMTREC)
MANUFACTURER'S NAME AND TELEPHONE NO.	OAKITE PRODUCTS INC. (908) 464-6900 (8am-5pm)	
ADDRESS	A Member of The CHEMETALL Group 50 Valley Road Berkeley Heights NJ 07922	
DATE OF PREPARATION	11-01-94	

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SECTION II - HAZARDOUS INGREDIENTS

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	CAS NO.	% BY WT	ACGIH OSHA		UNITS
			TLV (TWA)	PEL (TWA)	
Diphosphoric acid, tetrapotassium salt	0007320345	10-20	NE	NE	
Trade Secret Registry (735517)	-5022P	<5	NE	NE	
Trade Secret Registry (735517)	-5028P	<5	NE	NE	
Trade Secret Registry (735517)	-5033P	<5	NE	NE	
Non-hazardous ingredients		Bal.			

Unidentified ingredients are considered not hazardous under Federal Hazard Communication Standard (29 CFR 1910.1200).

All components of this material are on the US TSCA Inventory.

CARCINOGENICITY: No substance in this product is listed by IARC, NTP, or regulated by OSHA as a carcinogen.

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SECTION III - PHYSICAL DATA

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BOILING POINT (F)	NE	SPECIFIC GRAVITY (H2O=1)	1.198
VAPOR PRESSURE (mm Hg)	NE	Bulk Density	9.98 lb/gal
VAPOR DENSITY (Air=1)	NE	PERCENT VOLATILE	

NA - Not Applicable

NE - Not Established

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Oakite® MATERIAL SAFETY DATA SHEET

SOLUBILITY IN WATER	Complete	BY WEIGHT(%) Excludes H2O	0
EVAPORATION RATE (BuAc=1)	<1	PH @ 5% by vol.	9.8
APPEARANCE AND ODOR	Amber liquid;mild odor.	PH (concentrate)	9.8

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SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (Method Used): None

FLAMMABLE LIMITS: LEL: NA UEL: NA

EXTINGUISHING MEDIA: Use media suitable for surrounding materials.

SPECIAL FIRE FIGHTING PROCEDURES: No special procedures required.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None known.

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SECTION V - HEALTH HAZARD INFORMATION

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ROUTE(S) OF ENTRY:	INHALATION:	SKIN:	INGESTION:
	X	X	X

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known

SYMPTOMS/EFFECTS OF OVEREXPOSURE:

Prolonged or repeated inhalation of vapors can cause nasal and respiratory irritation. Direct contact with eyes causes irritation. Direct contact causes skin irritation.

FIRST AID

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

SKIN: Wash affected area with plenty of water for at least 15 minutes.

INGESTION: Contact local poison control center or physician IMMEDIATELY!

INHALATION: Move victim to fresh air.

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SECTION VI - REACTIVITY DATA

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STABILITY: NORMALLY STABLE

INCOMPATIBLE MATERIALS: Strong acids.

NA - Not Applicable

NE - Not Established

4401

Oakite MATERIAL SAFETY DATA SHEET

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, Carbon monoxide, Phosphorous oxides.

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SECTION VII - SPILL OR LEAK PROCEDURES
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PROCEDURES: Wear personal protective equipment (See Section VIII).
Clean up with absorbant material. Flush area with plenty of water.

WASTE DISPOSAL METHOD: Dispose of in accordance with Local State and Federal regulations.

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SECTION VIII - SPECIAL PROTECTION INFORMATION
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RESPIRATORY: Respirator not normally required. For symptoms of overexposure, wear a NIOSH-approved dust/mist respirator.

EYEWEAR: Wear chemical safety goggles.

CLOTHING/GLOVES: Wear neoprene or other chemical-resistant gloves and protective clothing.

VENTILATION: Local exhaust may be necessary for some handling/use conditions. Specific needs should be addressed by supervisory or health/safety personnel.

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SECTION IX - SPECIAL PRECAUTIONS
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Store in closed container.

APPROVAL: Michael Chang Mgr. Health & Environmental Dept. 11/01/1994

NAME TITLE DATE OF PRINTING