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# PURPOSE

## To establish minimum requirements for the protection of human health and the environment from the hazards associated with decommissioning, decontamination and moving of equipment, parts and support systems.

# SCOPE

The provisions of this standard apply to all TI employees, suppliers, vendors, and visitors at TI sites worldwide.

The provisions of this standard apply to decommissioning, decontamination, and movement, including routine and non-routine cleaning, of semiconductor manufacturing equipment (SME), subsystems and equipment parts by means of assessment, mitigation and control of potential hazards to ensure the machine, subsystem or part is in a safe state prior to movement.

The provisions of this standard apply to equipment, machinery, subsystems and parts used directly or indirectly in the manufacturing, assembly, test and development of product or in the operation of facilities or production support systems and utilizing any of the following:

## Hazardous production materials;

## Electrical potential 120 Volts or greater (phase to ground);

## Ionizing or non-ionizing radiation;

## Mechanical guarding;

## Thermal hazards; and

## Robotics or automation.

# reference documents

## TI Standard Policy and Procedure (SP&P) 04-04-01: “Environmental, Health and Safety”

## TI Standard 03.01C “Hazard Communication and Chemical Labeling”

## TI Standard ENV04.01 “Hazardous Waste Management”

# definitions

[TI ESH Standards Glossary of Definitions](https://sps01.itg.ti.com/sites/wwf/esh/standards/Knowledge_Bank/00.01.xlsx)

# REQUIREMENTS

## Sites shall develop a process for the decommissioning, decontamination and movement of manufacturing equipment, subsystems and parts which includes:

### A means to determine the potential hazards and control measures required to protect personnel.

### Completion of the Decontamination and Materials Movement Checklist (Appendix A).

#### Prior to movement, the Decontamination and Materials Movement Checklist must be verified as complete and signed by equipment or project owner, decontamination team member, and site ESH, or approved designees.

#### One copy of the completed Decontamination and Materials Movement Checklist must be sent with the equipment, subsystem or part.

#### One copy of the completed Decontamination and Materials Movement Checklist must be retained by the removing site in accordance with TI’s ESH Record Retention Matrix.

### After completion of the Decontamination and Materials Movement Checklist and final inspection, securely attach a tag with the following characteristics:

#### Color: orange;

#### Origin site;

#### Equipment description;

#### Asset number (when known);

#### Comment;

#### Transfer approval status;

#### Hazard Information; and

#### Authorization by site ESH professional:

##### Name;

##### Signature; and

##### Date.

Note: Movement of equipment within a site may be considered exempt from the Decontamination and Movement Checklist and Orange Tag Process if the equipment is cord/plug and has not been contaminated.

Note: All hazardous waste must be managed according to TI ESH Standard ENV04.01 “Hazardous Waste Management”.

## Routine and non-routine contaminated parts cleaning

### Sites shall establish a process which includes, at a minimum:

#### A means to determine the potential hazards and control measures required to protect personnel;

#### Provisions to ensure proper packaging; and

#### Provisions to meet TI ESH Standard 03.01C “Hazard Communication and Labeling”.

## Roles and responsibilities

### Equipment, part, subsystem or project owner

#### Notifies affected personnel;

#### Organizes activities; and

#### Organizes completion of the Decontamination and Materials Movement Checklist.

### Decontamination team member

#### Decontaminates or decommissions equipment, parts and support systems (or verifies decontamination/decommissioning work has been completed according to TI requirements).

### Site ESH or Designee

#### Provides ESH related support;

#### Verifies completion of the Decontamination and Materials Movement Checklist; and

#### Verifies adherence to the Orange Tag process described in section 5.1.3.

### Logistics

#### Ensures the shipping and transportation of equipment, parts and support systems meets all applicable shipping and transportation laws and regulations.

## Training

### The site shall ensure that persons responsible in the equipment, subcomponents and parts movement processes have received training or are by other means competent to perform their roles.

# Standard Approval

This standard has been approved by David Thomas, TI Vice President.

# REVISION HISTORY

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rev#** | **Date** | **Nature of Revision** | **Author/Editor** | **Approver** |
| A | 09/27/2005 | Major periodic review | Christie Lotspeich |  |
| B | 12/22/2006 | Major review in conjunction with 03.01 series of standards | Christie Lotspeich |  |
| C | 12/12/2007 | Section 3.4.a – Exception sentence clarified by adding the prefix “Exception” | John Willis |  |
| D | 06/12/2013 | Major review and rewrite including  removal of written program and  addition of standardized checklist | Jack McAdams  Dale Moore  Matt Jones | ELC |
| E | 05/22/15 | Minor change to Section 2.0 – replaced ‘semiconductor production equipment’ with ‘semiconductor manufacturing equipment (SME)’ and added definition to the Standards glossary | Matt Jones | ELC |

**Appendix A**

**Decontamination and Materials Movement Checklist**

|  |  |
| --- | --- |
| Section 1: Contact Information | |
| Contact Name |  |
| Contact Phone Number |  |
| Contact Email Address |  |
| Current Date |  |
| Department/Module |  |

|  |  |
| --- | --- |
| Section 2: Equipment Information | |
| Manufacturer |  |
| Model |  |
| Part Number |  |
| Asset No. |  |
| MISTI ID No. |  |
| Equipment Description |  |
| Date of Decommission |  |

|  |  |
| --- | --- |
| Section 3: Equipment Disposition | |
| Relocate within TI | Yes  No |
| Sell/Donate outside TI | Yes  No |
| Warehouse/Surplus | Yes  No |
| Return to Equipment Mfg./Vendor | Yes  No |
| Scrap | Yes  No |
| Receiving Location |  |

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| --- | --- | --- | --- | --- | --- |
| Section 4: Tool Component Information  Note: If you answer **“Yes”** to any question in section 4 notify ESH representative. Items in this section depending on amounts, pressure or magnitude could require special shipping instructions. ESH will work with TI Logistics to determine proper packaging, labeling and shipping methods. | | | | | |
| **Description** | **YES** | **NO** | **NA** | **Initial** |
| Does tool contain any radioactive material or components capable of producing ionizing or laser radiation? |  |  |  |  |
| If the tool contains radiation source or laser, list type and class. (Note: Contact Site ESH before moving tool) |  | | | |
| Does any component contain refrigerant? |  |  |  |  |
| If the tool contains refrigerant, what type of refrigerant (i.e. R-22, R-134a, etc.) amount in pounds and pressure? |  | | | |
| Does tool contain Cryo pumps/compressors? |  |  |  |  |
| If tool contains Cryo pumps/compressors list gas type, amount, and pressure. |  | | | |
| Does tool contain magnets? (electro or fixed magnets capable of creating/emitting a magnetic field outside the confines of the equipment) |  |  |  |  |
| Have all magnets been degaussed? |  |  |  |  |
| Does tool contain any mercury (switches, relays, lights etc.)? |  |  |  |  |
| Does tool contain any compressed gases (vessels, cylinders, fire extinguishing systems, etc.)? |  |  |  |  |
| Does tool contain batteries? |  |  |  |  |
| If the tool contains batteries, what type (lead acid, lithium, etc.)? |  | | | |
| Does tool/equipment contain asbestos? |  |  |  |  |
| List potential hazardous energies (i.e. stored electrical, mechanical, or pneumatic energy, etc.) |  | | | |

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| Section 5: Tool Process Information  Note: If tool or part has been exposed to “Hazardous Materials” notify ESH and Decon for proper PPE , Decontamination and testing instructions. | | | |
| **Description** | **YES** | **NO** | **Initial** |
| Has this part or tool been exposed to hazardous materials? If “Yes” then list all hazardous chemicals/gasses used. If “No” proceed to section 6 of this document |  |  |  |
| Corrosives |  | | |
| Solvents |  | | |
| Lead |  | | |
| Arsenic |  | | |
| Other Toxics/Pyrophorics |  | | |

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| Section 6: Equipment Decontamination Checklist  Note: For any box checked “No” you must provide an explanation in the space provided at the bottom of this section. This could prevent or delay shipment of equipment or parts.  Note: Mechanically capped/plugged refers to fitting, flanges, other devices that will remain secure and prevent leakage of residual liquids, gasses, or by-products that remain in the equipment or part. (e.g. Swagelok, VCR, KF flange caps, etc…). These caps or plugs must be constructed of a material compatible with chemicals/gasses and materials used in or on the equipment. | | | | |
| **Description** | **YES** | **NO** | **NA** | **Initial** |
| Has tool or equipment received thorough cleaning (e.g. Wet clean, Kit Change, Wipe down, etc)? |  |  |  |  |
| Have all Non-Hazardous (Inert) gasses been evacuated/purged and disconnected from the equipment and lines mechanically capped/plugged? |  |  |  |  |
| Have all Hazardous gasses been evacuated, cycle purged and disconnected from the equipment and lines mechanically capped/plugged? |  |  |  |  |
| Have all chemical baths and tanks been drained, flushed and dry? |  |  |  |  |
| Have all chemical lines been drained, flushed, dry and mechanically capped/plugged? |  |  |  |  |
| Have all associated support equipment been purged, drained and flushed accordingly and lines mechanically capped/plugged? |  |  |  |  |
| Have all water lines (e.g. DI, PCW, Coolant, Chilled) been drained, purged and mechanically capped/plugged? |  |  |  |  |
| Have all process exhaust lines, drains or other outlets been cleaned, flushed and mechanically capped/plugged? |  |  |  |  |
| Have all stored energies (e.g. Electrical, Pneumatic, Hydraulic, Mechanical etc..) been dissipated or controlled in a safe state to prevent release? |  |  |  |  |
| Have parts separated from the equipment been appropriately cleaned/decontaminated? |  |  |  |  |
| Are contaminated parts being sent to external vendor for cleaning double bagged, packaged and labeled with hazard identification? |  |  |  |  |
| Have pumps (Process, Turbo) been purged and wiped down and mechanically capped/plugged? |  |  |  |  |
| Comments: | | | | |

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| Decontamination Criteria  Note: Verifications used to determine effectiveness of decontamination activities. Equipment owner should coordinate verification activities with ESH and Decon groups. | |
| **Hazard Type** | **Acceptable Decontamination Parameters** |
| Corrosives (pH) | pH = >5 - <9 (pH level must be between 5 and 9) |
| Fluoride Ion | Non-detect using fluoride test strip |
| Solvents/Photoresist | No free liquids, remove solids and residue as much as possible. Discoloration allowed (Visual Verification) |
| Arsenic | Less than 50 micrograms/100cm2 |
| Lead | Less than 200 micrograms/100cm2 |
| Magnetic Fields | 1. Does not exceed 0.418 A/m (0.00525 gauss), or  2. Produces a magnetic compass deflection of 2 degrees or less.  (Contact TI Logistics for more detail) |
| Coolants and Water | No free liquids (Visual Verification) |
| Phosphorus Compounds | No visible residue |
| Others | See ESH department |

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| --- | --- |
| Section 7: Equipment Decontamination Verification  Note: Wipe samples and pH results are to be recorded in this document. | |
| Explain activities performed to minimize/eliminate the amount of hazardous substances residuals/byproducts in or on the equipment (Wet cleaned, cycle purged, kit change, neutralized, oil drained, etc) |  |
| Describe the verification procedure used to determine if decontamination was successful (visual inspection, wipe samples, pH test, air monitoring etc…). |  |
| List areas of the equipment that may still be contaminated or contain residual gasses/chemicals? (Ensure proper containment is in place to prevent accidental release) |  |
| List remaining contaminates by type and amount. (Process byproducts, Gasses, Chemicals) |  |

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| Decontamination Sample Results | | | |
| **Sample #** | **Location** | **Method** | **Results** |
| Example | Chamber A Reactor | pH Test Strips | pH7 |
| Example | Implant Beam Line | Wipe Sample | 10µg/100cm2 |
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Equipment or Project Owner Signature: Date:

Decon Leader Signature: Date:

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| Section 8: Equipment Final Inspection  Performed by ESH or Designee  Note: Mechanically capped/plugged refers to fitting, flanges, other devices that will remain secure and prevent leakage of residual liquids, gasses, or by-products that remain in the equipment or part. (e.g. Swagelok, VCR, KF flange caps, etc…). These caps or plugs must be constructed of a material compatible with chemicals/gasses and materials used in or on the equipment. | | | | |
| **Description** | **YES** | **NO** | **NA** | **Initial** |
| Documentation is complete and satisfactory including methods of decontamination and verification of effectiveness? |  |  |  |  |
| Component and Process information has been communicated with TI Logistics for proper shipping methods and documentation? (Sections 4 and 5) |  |  |  |  |
| Final inspection has been completed according to the following?   1. Equipment appears undamaged and complete. (Document any discrepancies including photographs. Contact EE/Project manager if discrepancies noted) 2. All areas appear clean and free of liquids, process byproducts, other potential hazards. 3. All gas/chemical lines are mechanically capped/plugged and tight/secure (Including water lines). 4. All process exhaust lines and drains are mechanically capped/plugged and tight/secure. 5. Surface areas are free of dirt, grime, oils, other contaminates. |  |  |  |  |
| Comments: | | | |
| Orange Tag has been securely fastened to each tool/equipment including support equipment? |  |  |  |  |
| Notes:   * Include a copy of this worksheet in the main crate for receiving site to review. * Ensure that any remaining hazards are noted and include applicable Safety Data Sheet (SDS) with the worksheet. * Retain a copy of this worksheet according to the TI records retention policy. | | | | |

ESH or Designee Signature: Date: