5 - DRUM HANDLING

Title: Drum Handling **Doc. No.** 2015-MMTS-5

Approval Signatures and Date

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	Initial Release		Annual Review/No Revision Required		Annual Review/Update (see history below)

NOTE: *This document will be reviewed at least annually to ensure its suitability.*

Revision History

Rev. No.	Change description	Author
2	Change description Crosswalk Between NDEP CAPP Review Comments (dated 2014-12-09, 2015-01-30 and 2015-02-26) and Mercury Storage and Transfer Program Document Contents March 10, 2015	Burton Packard and Renee Rodriguez
1	Modified §5.3.2 in to add clarity to Facility Manager's actions in tracking placement of the 30th flask into a dedicated six-pack tray. Modified description in §5.3.4 of actions of the Drum Handling Room worker to store dedicated six-pack tray at the end of a workday.	

NOTE*: Hard copies of this document may not be the current version. Refer to the "IAmTheKey" to verify the current version.*

Reference Documents

Document number	Document title
Procedure 2015-MMTS-7	Fume Hood 2 – Mercury Transfer
Procedure 2015-MMTS-10	Waste Management

5.1 PURPOSE

This procedure describes operations in the MMTS: drum handling, flask removal, and flask placement in six-pack transfer trays (six-pack trays). Also covered is disposition of any drums containing loose mercury and management of empty drums, drip trays and pallets.

5.2 SCOPE

This procedure covers the drum and flask-related activities for operators in the Drum Handling Area. This procedure also covers waste handling activities by operators in the Drum Handling Area and by the forklift operator.

5.3 OPERATIONS

5.3.1 Required Equipment and Supplies (PPE as specified on page XI of the Executive Summary under General Safety and Health)

In addition to personal protective equipment, the following equipment is required for operations:

- Drum lift fixture,
- Flask-lift fixture and flask-foot fixture,
- Bag cutting blade,
- Waste containers

5.3.2 Drum Venting, Placement and Opening

- **Drum Handling Area worker**
    - Attaches a masking tape or equivalent label (tag) to the flask six-pack tray giving the pallet number and drum number. Facility Manager updates inventory tracking spreadsheets, as appropriate, to follow the mercury in flasks that is removed from a drum and placed in a six-pack tray.
    - Places the cart-mounted portable snorkel on the drum lid near the bung. Loosens the bung, removes the bung, and places an overhead snorkel into the drum lid. Repeats for each of the drums on the pallet, typically five (5). The snorkel must remain in each drum for at least five (5) minutes. Replaces the bung (finger tight only) immediately prior to lifting the drum. Wear leather gloves for this operation.
    - Follows the manufacturer's procedures for using the drum lift fixture (the drum lift fixture is shown in Section 5.4, Attachment 5.6).
    - Lifts the drum and inspects the bottom for mercury leaks or damage. Positions the drum adjacent to the conveyor table and gently lowers the drum approximately

onto the center of the 1000-lb capacity digital scale (see Section 5.4, Attachments 5.1 and 5.3).

- On a clipboard, records the drum weight and drum number compares the drum weight to the range of weights given in the following NOTE; notifies the Facility Manager if the drum weight is outside the acceptable range for a drum containing six (6) filled flasks.

NOTE: *The expected weight of the drum, packaging, flasks and mercury is about 550 lb ± 25 lb. The range accounts for differing flask weights and small variations in the amount of mercury. Alert the Facility Manager if the weight is outside the given range. Weights substantially below the given range may indicate that the drum contains fewer than the typical six flasks of mercury. The mercury stockpile records indicate that only 24 drums have fewer than six (6) flasks, out of over 21,600 drums in the mercury stockpile. Each of these drums has a special tag on it to highlight this fact.*

- Removes the drum lid, cuts a 3 to 4 inch slit in the polyethylene liner bag, inserts the snorkel tube into the bag for venting, and loosely replaces the drum lid (wears leather gloves for this operation).
- Removes the snorkel tube and drum lid. Makes visual check for loose mercury in the bag and/or drum. If loose mercury is observed, replaces drum lid without the locking ring, notifies Facility Manager and follows operations in Section 5.3.3.
- Positions the Airfiltronix® snorkel (located on the conveyer table) adjacent to the top of the open drum to collect vapors from the open drum-liner bag.
- Cuts the bag completely open to gain access to all the flasks (wears leather gloves for this operation); removes the cardboard flask separator and places it into the adjacent waste drum; inspects for loose mercury at the bottom of the drum using additional lighting.
- Slides back the cover over the fume hood conveyer table to access an empty flask tray.
- Places an empty bag (18"x20" re-sealable/3-mil) in each six-pack flask space prior to placement of a flask in the six-pack.
- Attaches the appropriate lift fixture (see notes below) to a flask and slowly raises the flask sufficiently to clear the six-pack tray on the conveyor table; and lowers the flask into the six-pack tray.
- Positions the hoist directly above the flask that is to be lifted.
- Lifts each flask a few inches and visually inspects the integrity of the connection prior to lifting the flask beyond the plane of the drum.

***NOTE**: Lift fixtures were designed, fabricated and tested for suitable use at ORNL. A multi-purpose lift fixture that can accommodate the different sizes of flask plug and the cross-drilled holes in the flask plugs can be used for lifting flasks out of the drum. This device is shown in Section 5.4, Attachment 5.2a. A second multi-purpose lift fixture that can also accommodate differently sized flask plugs and cross-drilled holes is shown in Section 5.4, Attachment 5.2b. All devices must be certified for service. The second lift fixture is designed to allow the lifting pin to be placed through the hole in the flask plug prior to grasping the pin and securing the fixture for the lift and is expected to be the primary device used. There are spare pins available and a cable attachment is utilized to ensure the pin is retrievable in the event the operator drops it.*

***NOTE**: Occasionally, a flask plug without a cross-drilled hole may be encountered; for that situation, the worker shall use the flask foot fixture (see Section 5.4, Attachment 5.5) for lifting after the "normal" flasks have been removed from the drum.*

- Carefully pushes a filled tray to an unoccupied position on the conveyer table and closes the table cover.
- In the now empty drum, places the pillow in the polyethylene liner bag and, using an available snorkel or vacuum line, evacuates the bag liner resulting in a smaller waste package; seals the package with vinyl tape; and places package into the waste drum. The cardboard divider material should be folded to reduce volume as much as practicable prior to evacuating the bag.
- Returns the empty drum to the pallet. Places the drum lid and locking ring on the drum. Tightens the locking ring sufficiently to prevent the drum lid from falling off (wear leather gloves for this operation).
- Wraps the pallet of empty drums with plastic or secures the drums in an equivalent fashion to prevent any drums from falling from the pallet while the pallet is being moved by forklift.

- **Facility Manager**

  Ensures the operations of Section 5.3.2 are repeated to maintain a full inventory of flasks ready for transferring mercury into the MT containers. Updates inventory tracking spreadsheets, as appropriate, to follow the mercury that is removed from drums and placed in six-pack trays, including 1) the fifth six-pack tray in a sequence, i.e., the one that has one position blocked off and 2) the dedicated six-pack tray (also known as the BIG ORANGE six-pack tray) that contains the 30th flask from each sequence of five six-pack trays.

- **Forklift operator**

Retrieves and transports the pallet of five empty drums to the drum accumulation area in Building 110-66. Places the drip tray and pallet in the reuse or recycle sorting areas.

5.3.3 Disposition of Damaged Flask in Drum

- **Facility Manager**
  - Using the cart-mounted portable snorkel, lifts lid and verifies the presence of loose mercury.
  - Marks the drum and the lid to indicate the drum contains loose mercury and a damaged flask, and directs the drum handling area worker to seal the drum and return it to the pallet. Updates inventory tracking spreadsheets, as appropriate, to show location of the drum with loose mercury.
- **Forklift operator**
  - Retrieves and transports the pallet of drums (four empty and one with loose mercury) to Building 110-66
  - Places the empty drums in the drum accumulation area.
  - Places the pallet and the drum with loose mercury in the location designated by the Facility Manager.

***NOTE**: The drum with loose mercury is placed onto a pallet/drip tray at a temporary storage area in Building 110-66. Within a year, the drum will be returned to MMTS where Procedure 2015-MMTS-26 will be followed to extract the mercury and clean up the drum and flasks sufficiently for disposal.*

5.3.4 Actions at the End of the Workday

- **Drum Handling Area worker**

  Ensures that the dedicated six-pack tray (also known as the BIG ORANGE six-pack tray) containing the 30th flask from each sequence of five six-pack trays is stored in Fume Hood 1 and the side door between the conveyor table and Fume Hood 1 is closed.

- **Facility Manager**

  Ensures that the inventory tracking spreadsheets correctly show any mercury located in Fume Hood 1.

5.4 RECORDS

Up-to-date inventory tracking spreadsheets showing all mercury moves from the beginning to the end of the workday.

5.5 ATTACHMENTS

Arrangement of Conveyer Table, Fume Hood Station One, Fume Hood Station Two, and Related Equipment (Attachment 5.1)

Flask Lifting Fixtures (Attachments 5.2a and 5.2b)

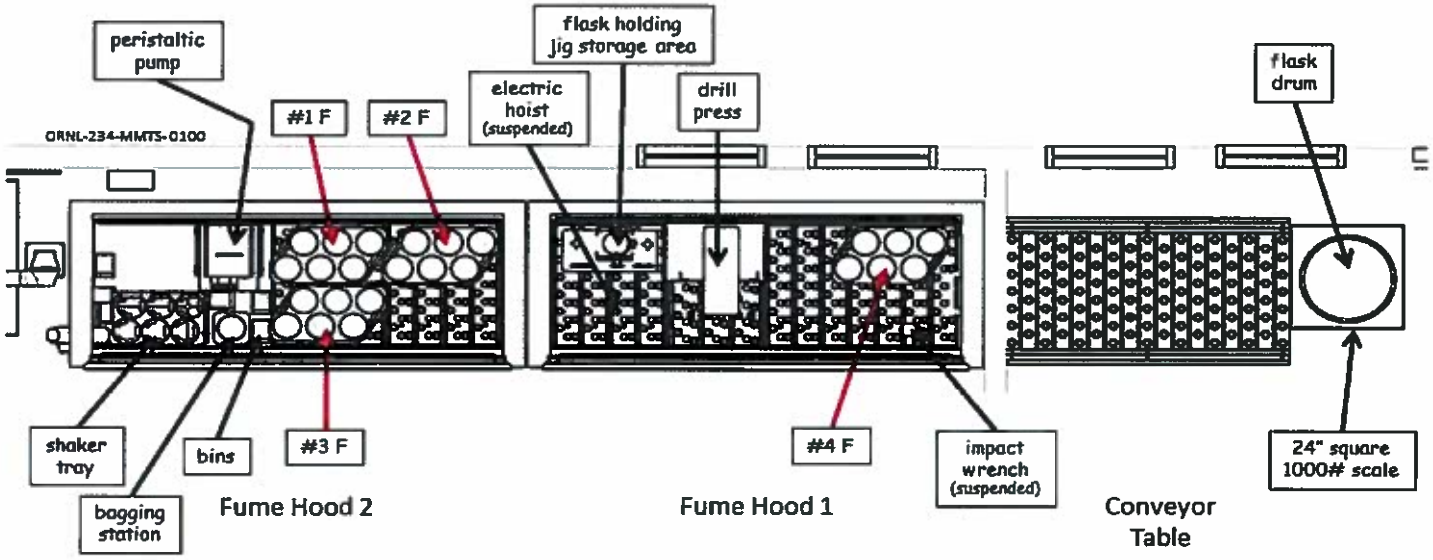
Digital Scale – PDS-1000, 1000 Pound Capacity Drum Scale (Attachment 5.3)

Airfiltronix® portable snorkel mounted on the conveyor table and positioned to remove mercury vapor from a drum (Attachment 5.4)

Flask foot fixture (Attachment 5.5)

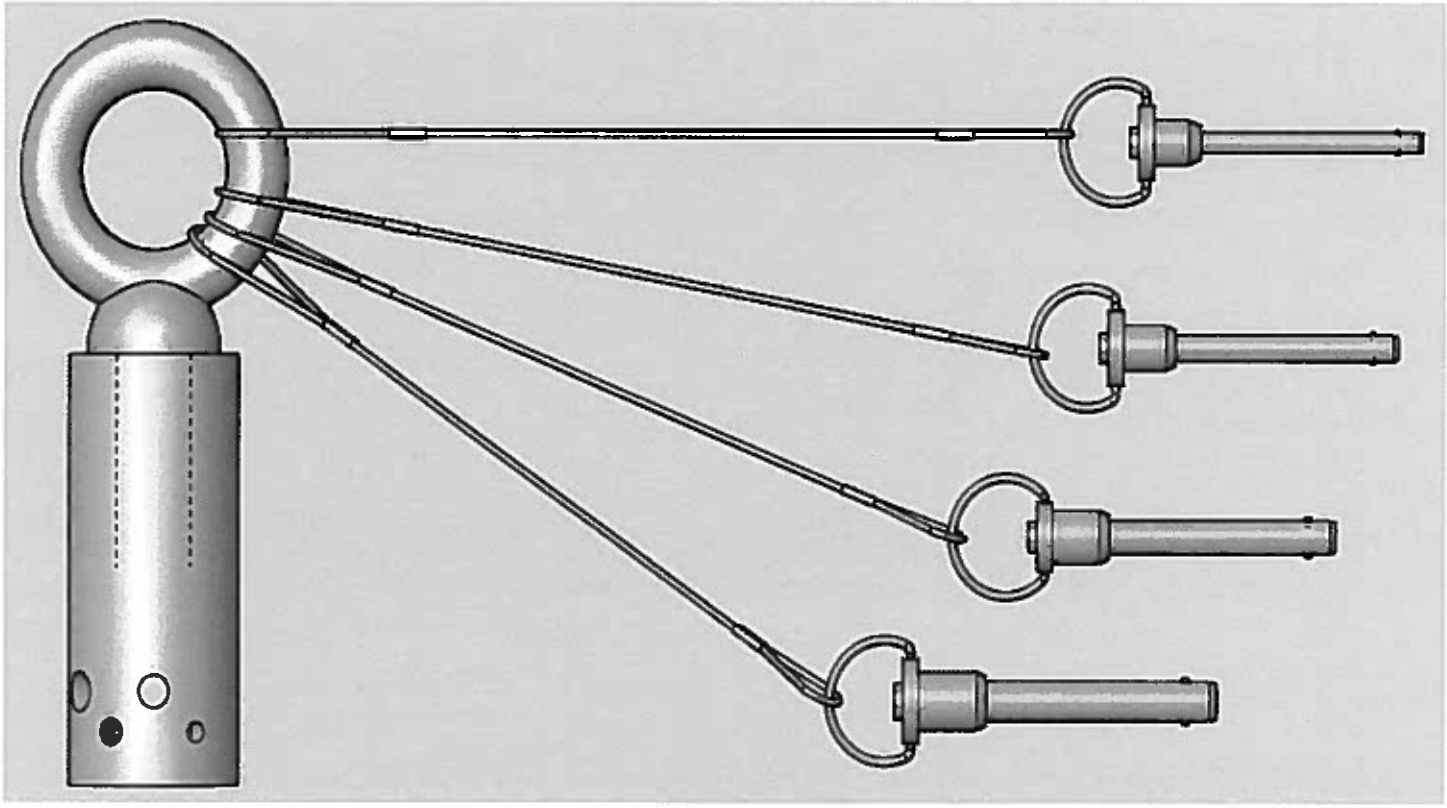
Drum lift fixture (Attachment 5.6)

ATTACHMENT 5.1 Arrangement of Conveyer Table, Fume Hood Station One, Fume Hood Station Two, and Related Equipment



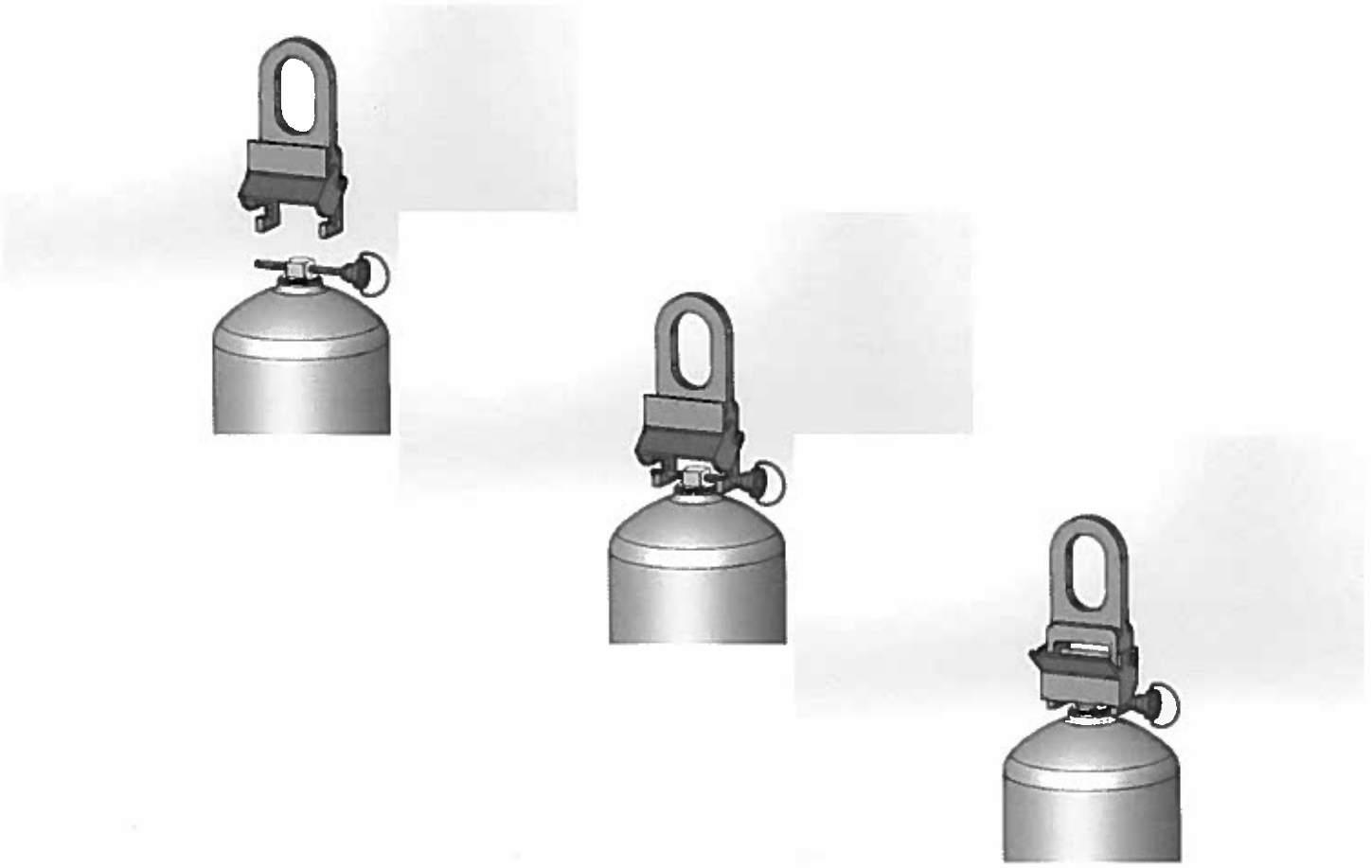
This drawing shows the Conveyer Table, Fume Hood Stations 1 and 2, and equipment located in the fume hoods. The four flask trays shown are the maximum number of trays that can be under the controlled environment of the hoods. Note in this arrangement the "F" designation for the trays means they contain flasks full of mercury.

ATTACHMENT 5.2a Flask Lifting Fixture



This figure shows a flask lifting fixture that requires the hole in the lifting shell to be aligned with the hole in the flask stopper prior to secure insertion of the lifting pin.

ATTACHMENT 5.2b Flask Lifting Fixture



This figure shows a flask lifting fixture that attaches securely to the lifting pin after the lifting pin is inserted through the hole in the flask stopper.

ATTACHMENT 5.3 Digital Scale – PDS-1000, 1000 Pound Capacity Drum Scale

PDS-1000 Drum Scale

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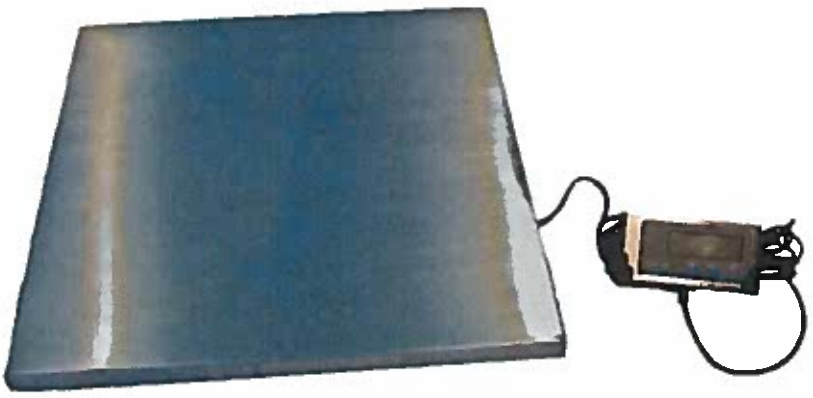
A and A Scales LLC
Phone 800-481-4114 or 973-800-3965
Open 7 days a week
No sales tax for customers outside New Jersey
We will not be undersold!

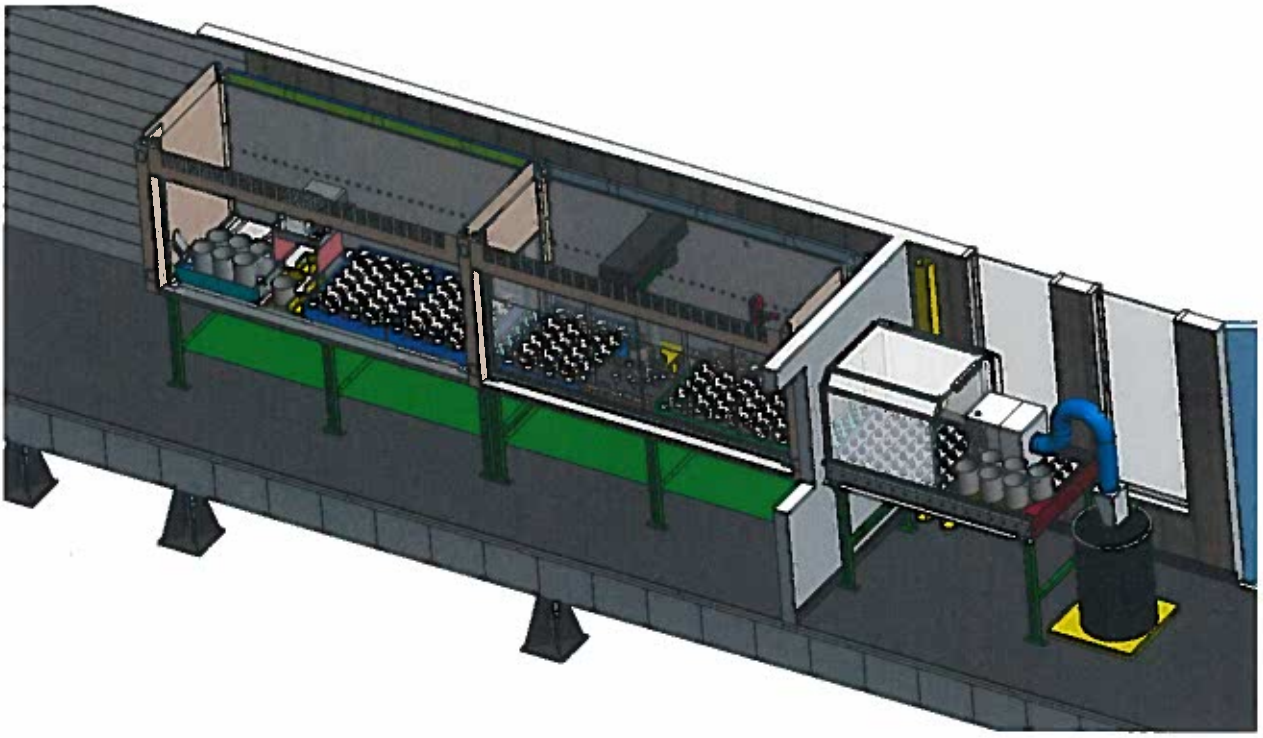
E-MAIL

PDS-1000 Drum Scale
1000 lb x 0.5 lb
Price: $499
Free shipping
Buy

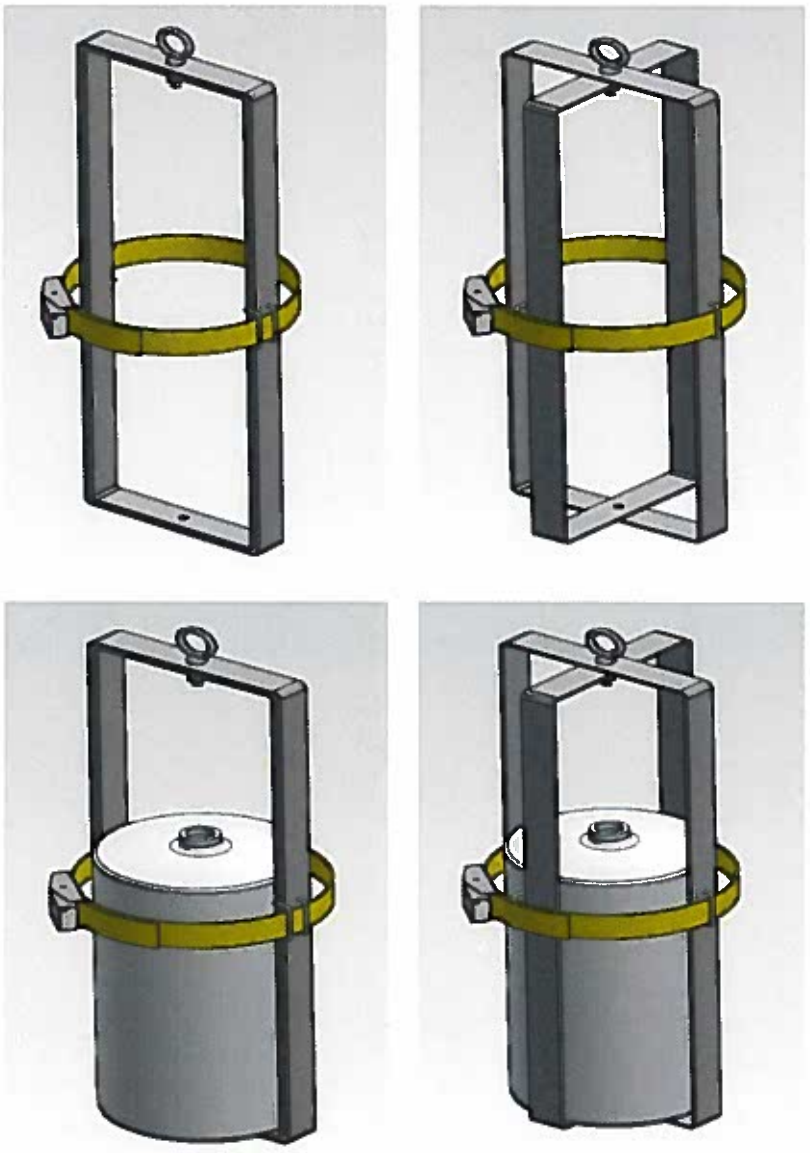


* 24" x 24" - 1000 lb capacity platform
* Stainless Steel cover, painted steel substructure
* Digital Display is battery / Electric powered
* Low profile scale platform
* Easy to read LCD display
* Digital Display comes standard with wall mounting bracket
* 15 ft cable from platform to display

ATTACHMENT 5.4 Airfiltronix® portable snorkel mounted on the conveyor table and positioned to remove mercury vapor from a drum



ATTACHMENT 5.5 Flask foot fixture



The flask foot fixture allows a worker to safely remove from a drum a flask that has a damaged flask plug or a flask plug without a cross-drilled hole. This fixture is used after as many flasks as possible have been removed using a lift fixture shown in Attachment 2a or 2b.

ATTACHMENT 5.6. Drum lift fixture